DOCUMENT RESUME

ED 175 777 SO 011 944

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TITLE A Comparative Evaluation of Values-Oriented and Non-Values-Oriented Environmental Education Materials. Final Report.
INSTITUTION Social Science Education Consortium, Inc., Boulder, Colo.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Office of Environmental Education.
PUB DATE 15 Sep 77
GRANT G007602039
NOTE 234p.; Tables throughout document and Appendix C may not reproduce clearly in paper copy due to small and broken print type

EDRS PRICE MF01/PC10 Plus Postage.
DESCRIPTORS Cognitive Objectives; *Comparative Analysis; *Curriculum Evaluation; Educational Objectives; Educational Research; Energy; *Environmental Education; Inquiry Training; Knowledge Level; Science Education; Secondary Education; Student Attitudes; Teacher Attitudes; *Values

ABSTRACT

The document reports on a study of how different environmental education curriculum units affected secondary students' knowledge of and attitudes toward energy and environmental issues. The sample consisted of 16 secondary science and social studies teachers and 32 classrooms with over 600 students in nine Colorado school districts. Eight teachers used an inquiry approach and the other eight teachers used a values-oriented approach to teach a six week environmental education unit. All teachers used non-environmental education classes as control groups. Pre- and posttests and student and teacher questionnaires examined 16 variables, including general knowledge of environmental and energy issues; belief in the seriousness and importance of environmental and energy problems; feeling an ability to help solve environmental/energy problems; and supporting political, legal, educational, personal, and lifestyle solutions to environmental problems. Findings indicated that both treatments produced statistically significant cognitive gains which compared to control classes and that the values-oriented approach did encourage positive attitudes toward energy vs. environment tradeoffs and lifestyle solutions to energy problems. The conclusion is that there was no difference in students' gains in knowledge and only slight difference in attitudes toward environmental issues as a result of participating in a unit based on a values-oriented or inquiry approach. (DB)

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A COMPARATIVE EVALUATION OF VALUES-ORIENTED AND NON-VALUES-ORIENTED ENVIRONMENTAL EDUCATION MATERIALS

U.S.O.E. Grant No. G00-7602039

Final Report

September 15, 1977

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ACKNOWLEDGMENTS

Many individuals and organizations made important contributions to this project. First, we would like to thank the Office of Environmental Education, Department of Health, Education, and Welfare whose grant made possible this research and evaluation study. Second, we thank all the principals, teachers, and students in the participating schools for their cooperation and help during the project. Several other individuals also made major contributions to the success of the project. Bob Barrett, Teacher Associate with SSEC and on leave from the Lincoln (Nebraska) Public Schools, was responsible for much of the data collection and provided his keen "teacher perspective" in selecting and analyzing the textbooks, developing the evaluation instruments, communicating with the teachers, monitoring the lesson records of the teachers, and tabulating the results of the teacher and student reactions to the materials. Judy Hedstrom, Staff Associate with SSEC, contributed her knowledge of curriculum materials and analysis to the project. She also assisted in all of the tasks listed above. Irving Morrissett, Executive Director of SSEC, acted as Senior Consultant to the project, oversaw the major decisions made on the project, and critiqued the final report. Bob Richburg, Assistant Professor of Education at Colorado State University, provided much needed help in the earlier stages of the project including, clarifying the research design, developing the evaluation instruments, and obtaining several teachers to participate in the project. Greg Camilli, graduate student at the University of Colorado, was responsible for processing the data and obtaining the computer printouts of the results. Cindy Winn was the project secretary. She ably and reliably dispatched the responsibilities, which included typing letters, maintaining the project files, and placing the telephone calls. A number of other persons provided help on reviewing specific aspects of this project. They are: B.J. Meadows, Dick Casebeer, Jack Fraenkel, Angus Gunn, Roger Wangen, Charles Mitsakos. The authors would like to thank all these individuals for their help.

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U.S.O.E. Grant No. G00-7602039

A COMPARATIVE EVALUATION OF VALUES-ORIENTED AND NON-VALUES-ORIENTED ENVIRONMENTAL EDUCATION MATERIALS: AN OVERVIEW OF THE STUDY

In recent years there has been a tremendous increase in the amount and variety of commercially published curriculum materials in environmental education and values education. There has been, however, very little systematic evaluation of these materials. Moreover, only a few researchers have attempted to determine the degree of effectiveness of environmental education programs which contain an explicit set of values clarification or value analysis strategies. This study has been designed to provide some experimental and user feedback data in that area.

Purpose and Evaluation Questions

The central purpose of the study was to determine the extent to which two different environmental education units increase secondary students' knowledge of energy and environmental issues and change their attitudes toward the environment. One unit, which reflected a values clarification approach, was based on a minitext of case study dilemmas entitled Deciding How to Live on Spaceship Earth (Allen, et al., 1973). The other unit stressed social science inquiry procedures and was based on two other books of short readings--The Environmental Crisis (Meyers and Knisley, 1976) and The Energy Crisis (Buggey and Tyler, 1976).

Sixteen dependent variables were examined. The cognitive variables were: general knowledge of environmental issues, knowledge of energy issues, knowledge of land use issues, and total knowledge (a sum of the other three areas). The affective variables were: belief in the seriousness and importance of environmental problems, belief in the seriousness and importance of energy problems, valuing the environment, feeling an ability to help solve environmental/energy problems, support for political/legal, educational, personal, and lifestyle solutions to these problems, and positions on four tradeoff situations involving protecting and enhancing the environment, on the one hand, and developing more energy sources,

continuing economic growth, increasing our consumption capacities, and using our natural resources now, on the other.

The study was designed to answer the following specific evaluation questions related to those dependent variables:

1) Does the treatment in general (both values clarification and social studies inquiry) have a significant effect when compared to no treatment (control)?

2) When compared to no treatment (control groups), does the treatment in general have significantly different effects on specific population of:

a) suburban vs. rural students?
b) social studies classes vs. science classes?
c) male vs. female students?
d) students with high vs. medium vs. low prior environmental knowledge?
e) students with high vs. medium vs. low Internal Locus of Control scores?
f) students with high vs. medium vs. low scores on faith in human nature?

3) Are there significant differences in the effects of the two treatments (values clarification and social science inquiry) for the population in general?

4) Are there significant differential effects between the two treatments for specific populations of:

a) suburban vs. rural students?
b) social studies classes vs. science classes?
c) male vs. female students?
d) students with high vs. medium vs. low prior environmental knowledge?
e) students with high vs. medium vs. low Internal Locus of Control scores?
f) students with high vs. medium vs. low scores on faith in human nature?

Another purpose of the study was to obtain systematic teacher and student feedback on the specific books used in the treatment. Students and teachers evaluated the books they used based on a number of factors including the extent to which the books: stimulated and held their interest, were written clearly, included ample instructions and teaching suggestions, and needed much revision.

Sample, Treatment, and Design

The sample consisted of 16 secondary teachers (eight science and eight social studies) and 32 classrooms with over 600 students in nine Colorado school districts. Eight of the teachers and classrooms were in suburban settings and eight in rural settings. Eight teachers (divided evenly according to type of community and subject) taught a six-week values clarification oriented environmental education unit based on sections of Spaceship Earth to one of their classes. This book contains many short case studies describing environmental dilemmas and specific exercises and questions designed to clarify the value issues involved. The other eight teachers taught a six-week social science inquiry oriented environmental education unit based on parts of The Environmental Crisis and The Energy Crisis. Each of these books consists of short articles by various authors describing a particular problem, effect, or solution and reflecting a particular viewpoint. These books do not contain many exercises and questions explicitly designed to probe the value issues embodied in the articles. Except for two instances, each teacher used one of his or her other non-environmental education classes as a control group. Instruments were developed and tested to assess the dependent variables in the study. Slight modifications of existing scales were used to measure students' locus of control and faith in human nature. Pretests were administered from January 24 through February 4, 1977. Posttests were given from March 21 through April 18. Pretests and posttests were completed by 335 experimental students and 305 control students. Questionnaire forms were developed and administered to obtain the student and teacher evaluations of the books. All 16 teachers and 325 of the experimental students completed the forms.

Data Analysis and Results

In order to answer questions 1, 2a, 2b, 3, 4a, and 4b above, a four-way repeated measures analysis of variance was employed. Classroom mean change scores on the dependent variables were the unit of analysis. A one-way analysis of variance with students as the unit was used to answer questions 2c-f and 4c-f. Questionnaire data on student and teacher

evaluations of the books were tabulated and summarized. Mean scores were calculated on the Likert items and open-ended responses were tabulated and classified with frequencies noted.

The following results were obtained:

1) The experimental classes taken together (both values clarification and social science inquiry treatments) produced statistically significant ($p \leq .05$) cognitive gains when compared to the control classes on all four knowledge variables. The magnitude of the differences between the experimental and control mean change scores on the four cognitive tests was approximately one-fourth of a standard deviation. This occurred despite the fact that the books used in the treatment contained very little factual content, as judged by students, teachers, and project staff. This result may provide some evidence to support the contention of some social studies and science educators that use of inquiry process or values clarification process materials will also lead to knowledge gains for high school students. A significant difference between experimental and control classes occurred on one of the 12 attitude scales--belief in the seriousness and importance importance of the energy problem. The magnitude of the difference was approximately one-third of a standard deviation. The control group's belief decreased while the experimental group's remained constant during the treatment period, which occurred during the 1977 winter energy crisis. This result seemed to indicate that the six-week units used in this study helped to counteract the effects of history on the experimental classes. Thus, students who otherwise might not have remained concerned about energy problems from the beginning to the end of the winter energy crisis, maintained their belief in its seriousness and importance.

2) There were no strong, consistent, significantly different treatment effects (values clarification and social sciences inquiry taken together) on any of the groups considered in the study, including rural vs. suburban classes, science vs. social studies classes, male vs. female students, and students classified according to their prior knowledge of environmental issues, locus of control, and faith in human nature.

3) The two treatments (values clarification and social science inquiry)

produced significantly different effects on two of the twelve attitude scales (energy vs. environment tradeoff and lifestyle solutions) and none of the cognitive variables. On the latter attitude scale, the difference between the mean change scores of the two treatment groups was .4 standard deviation. The classes in the values clarification treatment registered a greater gain from pretest to posttest in support for lifestyle changes as an effective solution to the environmental problems than the social science inquiry classes.

4) The two treatments did produce significantly different effects ($p \leq .05$) for suburban vs. rural classes on four attitude scales--growth tradeoff, political/legal solutions, personal solutions, and educational solutions. Effects on two other attitude scales (energy tradeoff and consumption tradeoff) were similar but only significant at the .10 level. In the values clarification treatment, the rural classes moved toward protecting the environment and adopting certain legal, educational, and personal solutions to environmental/energy problems. The suburban classes, on the other hand, moved toward growth, consumption, and energy development and away from supporting those legal, educational, and personal solutions. In the social science inquiry treatment the opposite trend occurred. The suburban classes moved toward protecting the environment and adopting those solutions, while the rural classes moved toward energy and growth and away from supporting the political, educational, and personal solutions. The differences in the mean change scores between the rural and suburban classes for the two treatments ranged from one-fourth to over one-half of a standard deviation.

This result, particularly the effect of the social science inquiry unit, is difficult to explain. One possible explanation for the effect of the values clarification unit is that students were allowed to make decisions on these issues based on their own personal values. Values clarification does indeed stress decision making based on one's own value system. These values in turn may have reflected the needs of the type of community in which the students lived. Thus, perhaps the rural classes made their choices based on their closeness to the natural environment, while suburban classes made their decisions based on the their perceived

needs for energy and jobs. Whatever the explanation, these results do seem to indicate that two different kinds of process-oriented environmental education curriculum materials can have differential effects on students attitudes depending upon the type of community (rural vs. suburban) in which the instruction occurs.

Except for a few isolated cases (probably due to chance), there were no other treatment interaction effects on any of the other variables considered in the study. These variables included subject area, sex, prior knowledge of environmental issues, locus of control, and faith in human nature.

5) Teachers and students in the study had moderately positive reactions to the books used in the study. Spaceship Earth received slightly more favorable comments than did The Energy Crisis and The Environmental Crisis. Teachers agreed that both sets were written clearly and stimulated student interest and learning. They also agreed, however, that the books would have been better if they contained more factual information and if the concepts were better developed.

Further Research

These findings could be clarified and extended by a number of different studies. A replication of this study using different values clarification and social science inquiry texts would help confirm the differential effect on rural vs. suburban classes. Urban classes might also be included to determine the effects of the two approaches on that important segment of the community. Dependent variables such as decision making skills could be examined if appropriate evaluation instruments were developed. Other studies with similar evaluation designs might compare the relative effect of two or more values education approaches such as moral reasoning, inculcation, values clarification, and value analysis. These efforts could be extended to other subject areas including career education, ethnic studies, women's studies, and legal or civic education.

References

Allen, Rodney F., et al. Deciding How to Live on Spaceship Earth: The Ethics of Environmental Concern (The Values Education Series). Evanston, Illinois: McDougal, Littell, 1973.

Buggey, Joanne and June Tyler, The Energy Crisis: What Are Our Choices? (Inquiry into American Problems Series). Englewood Cliffs, New Jersey: Prentice-Hall, 1976.

Myers, Charles B. and C. Barry Knisley. The Environmental Crisis: Will We Survive? (Inquiry into American Problems Series). Englewood Cliffs, New Jersey: Prentice-Hall, 1976.

BACKGROUND AND NEED

In recent years there has been widespread interest and activity in environmental education and in values education. Many curriculum materials have been developed and published independently in each area. Recently, many educators, such as Knapp (1972), Cummings (1974) and Lamb (1975), have stressed the need for approaches to environmental education that focus on valuing and decision-making processes. Accordingly, curriculum packages have been developed to combine the objectives of environmental and values education. These texts and multimedia kits are based on explicit values models and treat various environmental problems as value conflicts that humans must clarify and resolve rationally and creatively. Usually they are designed for use in social science rather than science classes.

These values-oriented environmental materials are being disseminated to teachers all over the country. Their common goal is to stimulate young people to think critically, feel strongly, and act responsibly on environmental issues and in their everyday life. However, except for a few cases of formative field testing, these materials lack any systematic evaluation. Are any of these materials achieving these goals? Are environmental education materials based on explicit models of value inquiry more effective in achieving these goals than materials that do not embody such models? Are some of these materials more successful with certain types of students? With certain types of teachers? How do teachers and students who have used these materials rate them? This study attemped to answer these questions.

Systematic research and evaluation of the effectiveness of environmental education programs, especially published curriculum materials, has not been extensive. In response to this situation, Hendee (1972) has argued that missionary zeal must be supplemented by rigorous empirical research if environmental education is to contribute efficiently to the alleviation of environmental problems. Bowman (1974) has observed that little work has been accomplished in measuring attitude and value change in environmental education. Some recent exceptions to this generalization are the work of Bowman (1974), Cohen (1973), Cohen and Hollingsworth (1973), Hounshell and Liggett (1973), and Howell, Jr. (1974). Still the cognitive and affective environmental education instruments developed by these researchers have not been used widely to evaluate curriculum programs and materials.

Most of the evaluation efforts appear to be part of final reports of various government (federal, state, and local) funded environmental education programs. Most of these programs were local school district projects, designed to increase environmental awareness in teachers and students, K-12 (Center for Research and School Services, NYU, 1972; Hickey, 1973; Milwaukee Public Schools, 1973; Educational Management Services, 1973; Egan and Seidel, 1973; Poudre School District R-1, 1972; Lenihan and Cronin, 1969; Lunneborg and Lunneborg, 1971; Morgan, 1970; Sokol and Marshal, 1969). Some college outdoor education programs were also evaluated (Webb, 1974; College of the Redwoods and De Anza College, 1974). Other environmental education projects that have been evaluated include an effort by the New York City Environmental Action Coalition to change its network of recycling centers from collection points to educational centers (Edwards and Batty, 1973), a demonstration Urban Conservation Project developed by Boston's public television station (WGBH-TV, 1972) and the 1971 Youth Conservation Corps Pilot Program (Marans et al., 1972).

Several studies have attempted to evaluate the effectiveness of environmental education curriculum materials. Materials that have been tested include: an elementary and a secondary curriculum, each consisting of 34 units, developed by the Center for the Development of Environmental Curriculum and Willoughby-Eastlake City School District in Ohio (Willioughby-Eastlake City School District, 1974); an experimental course, "Man and His Environment," created by the Media Development Center, Eric Hamber Secondary School in Vancouver, British Columbia (Mulholland et al., 1971); an elementary environmental awareness program in Guam combining published existing supplementary materials with student projects and outdoor activities (Kallingal, 1974); a series of innovative exercises developed as part of an environmental science laboratory curriculum at Barnard College (Berger, 1972); a small-group guided instructional system stressing decision-making skills (Wales, 1973); a student manual for training senior high school students for employment in water treatment and air pollution control (Howell and Warmbord, 1974); and an environmental simulation exercise and game (Fennessey et al., 1974). None of these studies, however, have examined the effectiveness of materials disseminated and used widely across the nation.

As in environmental education, few efforts have been made to evaluate commercially published values education curriculum materials. Of the nearly 100

student and teacher resource materials analyzed by Superka et al. (1976), only 20 have undergone any kind of systematic evaluation process. Most of these materials were developed under federal grants and underwent only formative field testing. Few values education materials have been rigorously and objectively evaluated after publication. One exception is the Character Education Curriculum: Living With Me and Others (1974), an elementary values education program developed by the American Institute for Character Education and evaluated independently by the American Institute for Research (Bond et al., 1974).

Finally, there has been little systematic gathering of user feedback about curriculum materials, especially in environmental education. Through the Social Science Education Consortium's Curriculum Information Network (CIN) and the articles published in Social Education (Morrissett, 1973, 1975), teachers can find out how a sample of other educators rated a variety of social studies curriculum materials. Materials specifically designed to teach environmental education are not included in this survey. Another project that has attempted to collect teacher evaluations of social studies materials is the Diablo Valley Education Project. DVEP has helped teachers in Contra Costa County, California, use and evaluate the strengths and weakness of a variety of social studies materials. Since the focus of those materials has been war/peace and conflict/change only a few environmental education materials--such as the Scholastic Contact series text, "Environment: Earth in Crises" (Goodykoontz, 1973)--have been evaluated. In addition, most federally funded social studies projects, such as the High School Geography Project (Kurfman et al., 1968), assessed student and teacher attitudes toward the materials.

PURPOSE OF THE STUDY

The central purpose of this study was to determine the extent to which specific commercially published values-oriented (values clarification) and non-values-oriented (social science inquiry) environmental education materials:*

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*"Values-oriented" and "non-values-oriented" were initially used in the proposal for this project merely as convenient terms to distinguish the two treatments. All curriculum materials implicitly or explicitly involve values. "Values-oriented" simply referred to those student books which contain many questions and exercises based on an explicit approach to values education (e.g., values clarification or moral reasoning). These questions and activities are

1. increase secondary students' knowledge of environmental issues and facts, and

2. change secondary students' attitudes toward the environment.

In addition to assessing mean change between-group differences on these variables, a second purpose of the study was to compare the relative effectiveness of the two treatments (values clarification and social science inquiry) among several groups of students based on differences in the following characteristics:**

1. type of community (suburban vs. rural students),
2. type of class (social studies vs. science classes),
3. sex,
4. levels of prior environmental information,
5. internal-external locus of control, and
6. faith in human nature.

A third purpose of this study was to obtain detailed student and teacher evaluations of the particular materials used. Users commented on a number of aspects including whether the materials:

1. stimulated and held their interest,
2. communicated clearly and understandably,
3. had sufficient instructions and teaching suggestions,
4. were appropriate for high school students,
5. needed much revision, and
6. would be used again.

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designed to help students examine and discuss the value conflicts involved in environmental issues. Since the actual values-oriented book used in the study reflects mainly one approach, that unit will be referred to as the "values clarification" treatment throughout this report. The so-called "non-values" materials contain few if any of these values education questioning strategies and learning activities. Since the non-values-oriented book really uses a rational-analytical approach to studying social problems, that unit will be termed the "social science inquiry" treatment. We are using this term generally. Readers should not construe it to mean a systematic application of the procedures of an inquiry model including forming hypotheses, gathering and analyzing data, and drawing conclusions.

**Grade level was considered as another possible group characteristic. The student sample in our study did not, however, have a fair representation of the four high school grades. Moreover, no significant results occurred on any of the analyses related to grade level. This report, therefore, will not discuss this variable.

Dependent Variables

The specific objectives of the experimental aspect of the study were to determine the extent to which the two treatments affected student outcomes on each of the following dependent variables:

1. knowledge of environmental issues and facts including
   a) general knowledge of environmental issues,
   b) knowledge of energy issues, and
   c) knowledge of land use issues;
2. attitudes toward the environment as indicated by
   a) belief in the seriousness and importance of environmental and energy problems,
   b) valuing of the environment,
   c) feelings of being able to help solve the problems of environment and energy,
   d) support for certain types of solutions to the environmental and energy problems, and
   e) positions on the following "tradeoff" situations:
      1) the need to develop more energy sources vs. the need to protect and enhance the environment,
      2) the need for continued economic and industrial growth vs. the need to protect and enhance the environment,
      3) the need for increasing our consumption and recreation facilities vs. protecting and enhancing the environment, and
      4) the need to use natural resources now vs. the need to conserve them for the future.

Evaluation Questions

With respect to each of the student outcome dependent variables listed above, the study was designed to address each of the following questions:

1. Does the treatment in general (both values clarification and social studies inquiry) have a significant effect when compared to no treatment (control)? (X)*

*The letter codes (e.g. X, AX, SX, etc.) are provided to help readers reference computer generated tables of analyses and results which appear later in the report.

2. When compared to no treatment (control groups), does the treatment in general have significantly different effects on specific populations of:
   a) suburban vs. rural students? (AX)
   b) social studies classes vs. science classes? (SX)
   c) male vs. female students? (ATI - MAIN)
   d) students with high vs. medium vs. low prior environmental knowledge? (ATI - MAIN)
   e) students with high vs. medium vs. low internal locus of control scores?* (ATI - MAIN)
   f) students with high vs. medium vs. low faith in human nature scores?** (ATI - MAIN)
3. Are there significant differences in the effects of the two treatments (values clarification and social science inquiry) for population in general? (VX)
4. Are there significant differential effects between the two treatments for specific populations of:
   a) suburban vs. rural students? (VAX)
   b) social studies classes vs. science classes? (VSX)
   c) male vs. female students? (ATI - INTERACTIONS)
   d) students with high vs. medium vs. low prior environmental knowledge? (ATI - INT)
   e) students with high vs. medium vs. low internal locus of control scores? (ATI - INT)
   f) students with high vs. medium vs. low faith in human nature scores? (ATI - INT)

EVALUATION DESIGN

In order to address the evaluation questions listed above, sixteen teachers were selected to fit four categories as follows:

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*Locus of control is defined as a person's generalized expectancy for internal vs. external control of reinforcement and a feeling that one does or does not control one's own life. Persons with a high internal locus of control feel that they have much control over their lives.

**Faith in human nature is defined as a belief in the fundamental goodness or evil of people. Persons with a high faith in human nature believe that people are basically good, cooperative, and trustworthy.

EXHIBIT 1

Teacher Sample - Type of Community and Subject

	Suburban	Rural
Science	t_1, t_2, t_9, t_{10}	t_5, t_6, t_{13}, t_{14}
Social Studies	t_3, t_4, t_{11}, t_{12}	t_7, t_8, t_{15}, t_{16}

For each teacher, one class was designated as "experimental," one as "control." Within each of the four categories shown in Exhibit 1, two teachers were randomly selected to teach the "values clarification" materials, and two teachers were selected to teach the "social science inquiry" materials. The result was a 2 x 2 x 2 design (discipline by type of community by treatment), with a repeated measure (experimental vs. control, within teacher). This design is shown in Exhibit 2 below.

EXHIBIT 2

Evaluation Design

Treatment	Area	Subject	Teacher	Experimental	Control
Values Clarification	Suburban	Science	t_1	*	*
			t_2	*	*
		Social Studies	t_3	*	*
			t_4	*	*
	Rural	Science	t_5	*	*
			t_6	*	*
		Social Studies	t_7	*	*
			t_8	*	*
Social Science Inquiry	Suburban	Science	t_9	*	*
			t_{10}	*	*
		Social Studies	t_{11}	*	*
			t_{12}	*	*
	Rural	Science	t_{13}	*	*
			t_{14}	*	*
		Social Studies	t_{15}	*	*
			t_{16}	*	*

* = classroom mean change score

Experimental and control groups were selected from regular classes taught by the participating teachers. Two major factors were considered in selecting the experimental class for each teacher: how well environmental-related topics could be integrated or used in the course and the number of students in the class. For each teacher a control class was selected which was similar in age and ability to his or her experimental class, but which did not receive any environmental education instruction during the six weeks. Two teachers did not have such a class. In their cases a class of another teacher in the department which fit those criteria was used as the control group. Experimental and control classes received the same pretesting and posttesting.

All students in all thirty-two classrooms were given pre and posttests. Because of the length of the final test instrument, one half of the students in each class were randomly selected to be pre and posttested with Form #5 of the test, and the other half received Form #7. (These forms are described in the "Data Collection" section of this report.) In order to answer evaluation questions 2d and 4d (see page 4) with respect to affective variables, a shortened version of the knowledge test was included as part of the affective instrument. In order to answer evaluation questions 2e, 2f, 4e, and 4f, the "locus of control" instrument and the "faith in people" scale were included as an addendum to both the cognitive and affective instruments. This design was chosen for several reasons. Comparing each of the treatment groups with control groups taught by the same teachers provides control for teacher effect, school effect, and other associated variables. More important, the pre-post, experimental-control design controls for "history." Because of the energy crisis of early 1977, controlling for history proved to be especially critical.

The five student variables (see evaluation questions 2 and 4 on page 6) and the type-of-class variables were selected for two reasons. First in order to determine the generalizability of results, it is important to determine if all populations were similarly affected by the treatment(s). Second, examining the relative effectiveness of the treatments on different groups of students could reveal significant effects obscured by merely comparing the experimental group mean gain with the control group mean gain. Rarely is any curriculum material successful with all types of students. Prior knowledge, locus of control, and faith-in-human nature have each been found to be related

to the effectiveness either of environmental education instruction (Cohen and Hollingsworth, 1973) or of the development of democratic values (Simpson, 1971). Identifying the types of students with which particular curriculum materials are most successful would be an important contribution to improving instruction in environmental and values education.

In addition to the experimental research design, a survey of teacher and student reactions to the curriculum materials was conducted. This evaluation procedure was added to the research study because of its potential for generating meaningful classroom-use evaluative data on several widely disseminated environmental education texts at very little additional time or cost. Students and teachers assessed the strengths and weaknesses of the environmental education texts used in the study and made suggestions for how best to use the materials.

INSTRUMENTATION

Purpose

Essentially, the purpose of the instrumentation was to measure change in those knowledges and attitudes which might be expected to change as the result of the two treatments. A search for instruments measuring appropriate cognitive and affective variables produced disappointing results. Avaliable instruments suffered from several problems. Most cognitive instruments had obvious technical faults, and did not cover well the specific areas of land use and energy. The affective instruments also suffered from technical problems, and more seriously, it was often difficult to determine what variables were measured by the scales and the individual items. There did not appear to be any clear-cut sets of instruments measuring clearly defined variables of interest to the study. Thus, a two step instrument development task presented itself. First, it was necessary to define precisely which variables to measure, then it was necessary to construct scales measuring those variables.

The first step was relatively simple for the cognitive scales. First, appropriate specific environmental topics and sub-topics were selected. Since land use and energy were to receive main emphases of the units, they were determined to be the major focus of the test. A section on general knowledge of the environment was also included. Then we examined existing tests, the textbooks

to be used in the study, and other relevant curriculum materials* to select the sub-topics under energy, land use, and general environmental issues. That procedure led us to select the following subtopics:

1. Energy - energy sources and pollution related to energy consumption for coal, oil, solar, thermal, and nuclear energy.

2. Land Use - coal mining, off shore oil drilling, urbanization, dams, greenbelts, parks and wilderness areas, laws, and general land use issues.

3. General Environment - air and water pollution, population, science and ecology, pesticides, wildlife, and viewpoints of an environmentalist.

Decision making, value analysis, and synthetic thinking skills were also considered as possible cognitive dependent variables. We could not, however, identify any evaluation instrument that measured those variables in relation to environmental issues. Moreover, developing such an instrument was judged to be beyond the scope of this study. These important variables were, therefore, not dealt with in this study.

Determination of appropriate affective variables proved to be a much more difficult task. The method used to determine which affective variables to measure was to break down a number of available affective instruments into individual items and subsequently group those items into logical classifications. Most affective items were found to fit the following major and minor logical categories which later became scales:

1. belief in the seriousness and importance of environmental and energy problems;
2. valuing and wanting to protect and enhance the environment;
3. feeling an ability to help solve environmental and energy problems;
4. attitude toward tradeoffs between environmental quality and each of the following:
   a) energy development and use,
   b) economic growth,
   c) consumption of natural resources,
   d) present use of natural resources;

*[such as the NSTA Energy-Environment Sourcebook (Fowler 1975) and the Biological Science Curriculum Study land use unit in Investigating Your Environment (BSCS, 1975)]

5. supporting certain types of solutions to energy/environment problems including political/legal, personal, education, and life style solutions.

The first three affective dependent variables listed above can be related directly to common goals of environmental education. Most environmental education programs hope to produce changes in environmentally related behavior of their students. It can be logically argued that behavioral changes will more likely occur if students:

1. consider environmental problems to be serious, i.e., see the environment as being threatened (variable 1),
2. value the environment they see threatened (variable 2), and
3. believe their actions can help solve environmental problems (variable 3).

It appears, therefore, that treatment effects resulting in gains on these three variables would be pleasing to most environmental educators.

On variables 4 and 5 there is less consensus regarding desired changes. It seems important, however, to measure the magnitude and direction of change which can be attributed to the treatment(s). The essential questions in this respect are whether students exposed to "both sides" of environmentally related issues:

1. move in the direction of protecting the environment at the expense of energy, growth and consumption, or if they consider the cost of such sacrifices to exceed the consequent payoff in environmental preservation;
2. express more, or less support for various kinds of solutions to environmental problems.

Instrument Development: Dependent Variables

Subscales were developed to measure each of the three cognitive areas and each of the affective variables. The cognitive scale development first involved searching for items in existing tests, revising those items, and creating new ones to fill the gaps. Cognitive items did not generally reflect specific course content, because neither text included much factual information. Categorizing the items under the three main headings was sometimes difficult because of some overlap of topics for some individual items. This occurred particularly for questions dealing with land use and energy issues. The goal was to produce a 60-item cognitive test and a 90-item affective test, each of which could be

taken in one class period. In order to reach that goal, 111 multiple choice and true-false cognitive items and 123 Likert-type affective items were tried out on 117 high school students; from that pool, 64 cognitive and 88 affective items were selected and/or revised, according to the following criteria:

1. balanced content coverage,
2. item discrimination (based on item-test correlation and difficulty),
3. item feedback from the tryout population,
4. items which measured concepts considered important to the four people developing the test (all had environmental education experience).

Items and scales were revised based on the information from the field test and from logical considerations. Some items were rewritten, unreliable items were deleted, and some scales were deleted.

The final knowledge instrument consisted of three subtests: general knowledge of environmental issues - 17 items, knowledge of energy issues - 19 items, and knowledge of land use issues - 28 items. The 64-item cognitive test consisted of 47 multiple choice and 17 true-false items. (See Appendix A-1 for a copy of this test. The answer key is found in Appendix A-2.)

The final version of the affective instrument consisted of the follwing scales and number of items:*

SCALES	SAMPLE ITEMS	NO. OF ITEMS
Seriousness of Environmental Problems	Environmental problems affect me every day.**	10
Seriousness of Energy Problem	Generally, the energy shortage is getting worse every year.	7
Seriousness of Economic Problem***	Unemployment poses a serious threat to the future well-being of most Americans.	3
Valuing the Environment	It is unfortunate that there are fewer and fewer areas in this country where man has never set foot.	5

*See Appendix A-3 for the complete affective questionnaire.

**Response options were "Strongly Agree," "Agree," "Disagree," and "Strongly Disagree."

***This short scale was not used in any of the analyses.

SCALES	SAMPLE ITEMS	NO. OF ITEMS
Ability to Help	Teenagers really aren't in a position to have an effect on environmental problems.	6
Tradeoffs		
Energy vs. Environment Tradeoffs	We should continue to drill offshore oil wells even if some pollution of oceans and beaches results.	8
Growth vs. Environment Tradeoffs	It is a good idea to preserve some forests, even if that means we will have less lumber to build houses, schools, etc.	7
Consumption vs. Environment Tradeoffs	I think that auto pollution control is more important than good gas mileage.	7
Present Use vs. Conservation Tradeoffs	I think it is my responsibility to help save resources for my children and their children.	5
Political/Legal Solutions	We need stronger laws against pollution to protect our environment.	13
Personal Solutions	I probably would not write a letter to my congressman asking him to vote for environmental protection measures.	11
Education Solutions	Teaching topics like environmental issues and conservation in school is a waste of time.	3
Life Style Solutions	One of the best solutions to environmental problems is for people to live simpler lives.	3
	TOTAL	88

In addition, two situational dilemmas, each consisting of six items, were developed in order to have students respond to concrete cases involving energy/environment issues. The two dilemmas involved allocating funds for various social problems (including energy and environmental problems) and recommending the construction of new power plants in Colorado, Nebraska, and Wyoming.

Instrument Development: Independent Variables

In order to classify students into low, medium, and high categories in locus of control and in faith in human nature (to answer evaluation questions 2e, 2f, 4e, and 4f on pages and), it was necessary to administer instruments

measuring those constructs. For this purpose, two existing scales were modified. All five items of the "Faith in People Scale" (Rosenberg, 1957) were used. The response format for three of the items was changed to a four-choice Likert type (Strongly Agree to Strongly Disagree, No Midpoint) scale. Ten items from the "Locus of Control Scale for Children" (Nowicki and Strickland, 1972) were used to measure students' internality-externality. The responses were also changed to Likert scales. Three criteria were used in selecting those ten items from the original scale. First, any items referring to the students' relationships with their parents were omitted. Second, the most discriminating items were selected. Third, we avoided using two items which were similar in content. (These two scales can be found in Appendix A-3: Environmental Attitude Questionnaire, items 101-115.)

Instrument Development: Teacher and Student Evaluation of Materials

Three short instruments were developed to obtain student and teacher reactions to the textbooks used in the study. The "Teacher Curriculum Evaluation Form" consisted of seven Likert items (5 point scale) and three open-ended questions. The Likert items solicited teacher perceptions of the readability, concept development, evaluation guidelines, and student interest in the books. The open-ended questions asked for specific things they liked and disliked about the books and suggestions for revisions for future use. A second instrument asked teachers to list the two articles in the book they believed to be the best and the one they thought was the poorest and why.

The "Student Curriculum Evaluation Form" contained the same three open-ended questions and five Likert items. Those items asked students to rate the books in terms of how interesting, educational, and enjoyable they were, how difficult they were to read, and whether the students would recommend them to other students. (See Appendices A-6, A-7, and A-8 for copies of these three forms.)

Reliability

The cognitive and affective instruments were developed to detect group differences on all the dependent variables of interest, and to do so with a minimum of respondent time. Reliabilities in the range of .60 were considered adequate for the purpose of the study. Because it takes fewer items to develop

scales in the .60 reliability range, it became possible to measure the large number of dependent variables listed earlier.

For each scale, internal consistency reliabilities (Hoyt) were derived using the entire pretest population. Pretest-posttest correlations on the control group also yielded test-retest reliabilities on each scale. Those internal consistency and test-retest reliabilities are shown in Table 1 below. Generally, the distribution of scores on the various scales appeared to be approximately normal, with no apparent "ceiling" or "floor" effects.

TABLE 1

Reliability Coefficients for the Cognitive and Affective Scales

	Internal Consistency Reliability Coefficients	Test-Retest Reliability Coefficients
Cognitive Scales		
General Knowledge	.63	.70
Energy Knowledge	.75	.74
Land Use Knowledge	.68	.75
Total Knowledge	.95	.86
Affective Scales		
Seriousness of Environmental Problems	.71	.58
Seriousness of Energy Problems	.62	.54
Valuing the Environment	.50	.54
Ability to Help	.60	.50
Energy vs Environment Tradeoff	.60	.59
Growth vs Environment Tradeoff	.53	.64
Consumption vs Environment Tradeoff	.63	.65
Present Use vs Conservation Tradeoff	.50	.62
Political/Legal Solutions	.80	.56
Personal Solutions	.74	.50
Education Solutions	.67	.66
Life Style Solutions	.63	.50
Locus of Control	.71	.68
Faith in Human Nature	.46	.62

Validity

The content validity of the cognitive scales rests largely on the judgment of the four test developers and two external reviewers, all of whom had expertise in environmental education. The items selected were those which, in the opinions of the developers, measured important environmental facts and concepts. Additional reviews of the tests were made by the environmental education coordinator of a large school district and by an environmental specialist from a large Board of Cooperative Services. Any item to which any of the six reviewers or developers took major exception was deleted. Additionally, items which students reported to be ambiguous were deleted. Likewise, items which were shown by the item analysis to discriminate negatively were removed.

Evidence for validity of the affective scales includes apparent face validity in the judgment of the developers. Also, items in each scale and subscale generally correlated highly with the scale totals. In addition, a factor analysis performed on the pretest data generally supported the logically developed categories of items.

SAMPLE AND SAMPLING PROCEDURES

The sample consisted of 16 secondary teachers and 32 classrooms with over 600 high school students from 11 schools and 9 districts in Colorado.

As in most educational research, the teachers were not selected randomly. The typical procedure was to contact district level persons (e.g. social studies coordinator, science coordinator, or curriculum director) whom the staff already knew to explain the general purpose of the study and benefits to the school and teachers. The purpose was stated: to determine the effects of several environmental education mini-texts on students' knowledge about and attitudes toward the environment. If initial interest was expressed this was followed up with a letter and overview statement (see Appendix B-1 for overview). If and when the district contact identified teachers who might be interested, two staff members met with those teachers (and frequently an administrator). Questions they had about the project were answered at that time. The specific research objectives of the project were not specified. Copies of the books were left for them to examine. If the teachers wanted to participate they were told they would have

to accept teaching either one (the values clarification or social science inquiry book--those terms were not used with the teachers). It was explained that they would be randomly assigned to the books. When the teachers accepted those conditions they were asked to confirm the commitment to participate with a letter signed by them and their principal.

Twenty-one teachers were contacted. Sixteen agreed to participate in the study. Two refused because they believed the books could not be integrated well into their courses. Three teachers were eliminated because their team-taught environmental education course did not lend itself well to the experimental design of our study.

Several factors were considered in selecting the sixteen teachers. An equal number of science and social studies teachers, upper and lower division teachers, rural and suburban settings was desired. An attempt was also made to restrict the geographic area to the greater Boulder-Denver area. The final sample of teachers and schools met those criteria, except that three teachers (two science and one social studies) were located on the western slope of Colorado, near Grand Junction. (A list of participating teachers and schools is provided in Appendix B-2.)

The teacher sample consisted of eight social studies (two female and six male) and eight science teachers (one female and seven male). Each of those subject area groups was divided equally between rural and suburban teachers. Among the science teachers there were three who specialized in geology and earth science, three in biology, and two in ecology. The social studies teachers included three specialists in history, two in political science, two in geography, and one in sociology and psychology.

As a group, the 16 teachers were quite experienced. The average number of years of experience in teaching environmentally-related subjects was 7.4 years. The science teachers had somewhat more experience in both areas than the social studies teachers as the following indicates:

EXHIBIT 3
Teacher Sample - Experience

Average Number of Years

	Teaching Experience	Environmental Ed Experience
Science Teachers	15	8.4
Social Studies Teachers	10	6.4
All Teachers	12.5	7.4

Some measure of the teachers' attitudes toward environmental and energy issues was also obtained. Two of the initiatives which Colorado residents voted on in the November 1976 election were related to these issues. One was a nuclear safeguards initiative which would have required nuclear power companies to obtain permission from the state legislature to expand their facilities. The other initiative would have required a deposit to be placed on all beverage containers in order to encourage people to recycle them.

On the nuclear safeguards initiative seven teachers voted for the measure and nine against it. Most of those who voted for the initiative stressed either the environmental dangers of nuclear energy and the the need to develop other sources of energy, or the desire to have the people control decisions to expand the use of nuclear energy. Most of those against the measure emphasized either that the need for energy outweighed the risks or that the decision to expand nuclear capabilities should reside with the expert scientific community rather than the politicians. The science and social studies teachers were evenly divided on this issues: science teachers - three for and five against; social studies teachers - four for and four against.

EXHIBIT 4
Teacher Sample

Vote On Nuclear Safeguard Initiative

	For	Against
Science Teachers	3	5
Social Studies Teachers	4	4

As a group the 16 teachers supported the beverage container deposit intiative. Fourteen voted for it and most stressed that it was at least a start toward saving our natural resources, conserving energy, cleaning up the environment, and helping to change people's habits. The two social studies teachers who voted against the measure believed that the measure would not solve the litter/recycling problem.

During the election, residents of Boulder area were asked to vote on a measure designed to limit the growth of the city by setting a limit to the number of new residential dwellings. The teachers were asked to indicate how they would have voted on this issue and why. (Three teachers lived in Boulder and did actually vote on it.) Ten teachers voted for this measure to limit growth, four

voted against it, and two did not feel they knew enough about the specific proposal to answer the question. Most of those voting for the initiative stressed the need to start sometime to restrict and plan for the growth of communities in order to avoid environmental and resource problems. Two of those voting against the measure believed that growth needs to be limited on a county or statewide basis. Local measures would, according to them, merely create problems in the adjacent areas. Two other opponents believed the measure unconstitutional. Six of the eight science teachers and four of the eight social studies teachers supported the growth limit plan.

TREATMENT

Two types of treatments were used. One was a six-week values calrification unit based primarily on Deciding How to Live on Spaceship Earth (Allen et al., 1973). This mini-text contains many short case studies describing specific environmental dilemmas. The case studies present short open-ended dilemmas in a variety of areas including natural resources, noise pollution, land use, food, urbanization, and energy. Values clarification exercises and questions are used extensively. The "Introduction" explains and illustrates the particular values clarification model to be applied to the case studies. That model stresses processes such as identifying alternative solutions to value conflicts, inferring the values involved in a dilemma, analyzing the consequences of different alternatives, deciding on a course of action, and justifying that choice.

The second treatment was a six-week social science inquiry unit based largely on two mini-texts: The Environmental Crisis (Meyers and Knisley, 1976) and The Energy Crisis (Buggey and Tyler, 1976). Both are from Prentice-Hall's "Inquiry into American Problems" series. Each book consists of short articles from various authors and sources. The articles either describe a problem or solution and usually reflect a particular viewpoint. A large majority of the articles in Environmental Crisis express the environmentalist view. Although The Energy Crisis is better balanced, both books present articles reflecting both sides of most issues. Each book is organized into chapters dealing with the nature of the crisis and problem, its effects on people, and possible solutions. A few questions follow each article and a number of activities are listed at the end of each chapter. A social science inquiry approach is used

rather than any explicit model of values clarification. The questions and activities stress processes such as explaining the meaning of passages, identifying reasons, comparing and contrasting, examining evidence, and drawing conclusions.

One point about the two treatments needs to be restated. Any book on environmental issues naturally involves values and attitudes. For example, an article decrying the increasing urbanization of our country is filled with value positions and statements. Thus, the Crisis books are not value-free. They are distinguished from Spaceship Earth primarily because they do not contain an explicit set of strategies, procedures, and activities designed to deal with the values expressed in the articles and to probe the students' values in relation to those issues. One further qualification is required. Some questions and activities in the Crisis books call for students to express their values (How would you decide that case? What do you think is most important?). Unlike those of Spaceship Earth, they are not, however, part of a systematic model for helping students to clarify or analyze their own values. Moreover, the value questions are far outnumbered by the social science type questions such as: Is economic progress the cause of environmental problems? Why did he do that? What are the effects of that type of pollution? Thus, each treatment does reflect a distinctly different orientation to teaching environmental issues.

In formulating the specific nature of each six-week unit of instruction, an attempt was made to balance the desire to have a realistic test of the effects of these books on students and the need to conduct a valid educational research study. On the one hand, it was desirable for teachers to use those books as they would if they had obtained them on their own. On the other hand, some structure was needed in order to insure a somewhat common treatment among the teachers. The instructional units were designed to reconcile those factors.

The books upon which both treatments were based were designed to be used with other resources. Neither book is intended to be a complete text on environmental issues. Thus, the teachers were free to use additional resources of their own as they saw fit. Certain sections of each book were designated as "must" sections, and each teacher had to use them sometime within that period. From a second group of readings, teachers were instructed to use any four. Then, if they so desired and if time permitted, they were free to use any other sections

of the books. Approximately 1/3 of each book was to be used sometime during the six weeks.

Several criteria were used to select the sections to be used. First, land use and energy were to be the two major topic areas. Thus, articles or dilemmas were chosen which, in the opinion of the staff, best dealt with those issues. Second, sections were selected which the staff believed would interest and stimulate the students. Third, an attempt was made to select readings which, taken together, presented a balanced viewpoint. (See Appendix B-3 for outlines of the designated selections.) Except for these restrictions, teachers were encouraged to use the books as they normally would.

Initial planning meetings were held with all the teachers. The December 11 meeting involved 11 teachers in the Denver-Boulder area. A December 20 meeting was held for the three teachers on the western slope. Two teachers who could not attend those sessions were given individual meetings.

The content and procedures of each meeting were the same. A number of procedural and logistical matters were decided upon, including pretesting dates, teaching schedules, and teacher responsibilities. At that meeting teachers were provided forms on which they were to record their daily activities in the experimental class. Each week these were sent to SSEC. This procedure enabled the staff to monitor teacher activities and help insure that the designated sections were covered. It also gave the staff a fairly precise indication of what actually happened in the classrooms without using observers. (See Appendix B-4 for a sample form.) Teachers were also told of their textbook assignments at the planning meeting. (The procedure for determining those assignments is described in the "Evaluation Design" section.) The teachers then examined their texts and completed a tentative week-by-week outline indicating how and when they would use specified sections in their courses. Teacher training was not provided. Staff members did not suggest any questioning strategies, learning activities, or other materials to be used during the six weeks. The staff did not want to create any artificial aids to the teachers beyond what was necessary for the effective execution of the research study. To insure the distinctiveness of the treatments, however, those teachers from the same school were instructed not to compare strategies, activities or materials during the experimentation period.

In order to clarify the specific nature of the actual treatment, the daily lesson records of all participating teachers were examined. In addition to those records, discussions were held with the teachers at a debriefing session on May 14, 1977. (For a report of that meeting see Appendix B-5.) This process resulted in a description of the actual treatment, as contrasted to the "intended treatment."

The following aspects of the treatment were recorded and summarized: the length of time of the treatment period, approximate number of minutes and the percentage of class time spent on the books during the treatment period; the approximate number of minutes spent on out-of-class activities related to the book (e.g. reading the assignment); whether or not the assigned readings were completed and, if not, which ones were ommitted; and finally, the extent to which the involvement activities at the end of the chapters were used by the teachers.

Based on the data from those procedures the following statements can be made about the actual treatments:

1. The actual length of the values clarification treatment was 6-7 weeks, while the social science inquiry treatment lasted 5-6 weeks. (Teachers were allowed to use an extra week if they needed it to complete their assignments.)
2. Values clarification teachers used on the average about 60% of the class time on the treatment while the social science inquiry teachers used an average of 50% of the class time on the treatment.
3. With the exception of two social science inquiry teachers and one values clarification teacher, all treatments were evenly distributed within 5-7 week time span. Two of the exceptions (one in each treatment) spent nearly 100% of the last week on the treatment. The other teacher concentrated most of the instruction in the second and third week of his six week period.
4. Half of the teachers in each treatment used all the assigned articles and more, while half missed from 1-4 of the assigned articles (out of 18-20). All of those latter teachers, however, used other articles in the books that were not assigned. Moreover, on the average, over 90% of the assigned articles were used in both treatments.
5. Three-fourths of the teachers (six) in each treatment did not use the involvement activities at the end of the chapters. Two teachers in each treatment used them to a little or some extent. Questions embodied in or following each article reflecting each treatment (values clarification and social science inquiry) were used extensively by all teachers in written and/or oral formats.

In conclusion, although the values clarification treatment lasted a week longer and was slightly more intensive and evenly distributed than the social science inquiry treatment, the treatments were very similar in that nearly all articles were assigned and discussed in class. Very few involvement activities were used in either treatment. Discussion of questions related to the articles and reflecting the respective approaches (values clarification and social science inquiry) was a major activity for all teachers.

DATA COLLECTION

In order to maximize the amount of student data collected while minimizing the testing time required, two different forms of the knowledge and attitude survey were constructed. One form, "Environmental Survey #5" (see Appendix A-4), consisted of the entire 64-item cognitive test plus three attitude scales: the tradeoffs, locus of control, and faith-in-people. The other form, "Environmental Questionnaire #7" (see Appendix A-5), consisted of the 115-item affective instrument (including locus of control and faith-in-people) plus 22 items from the cognitive test.

The pretesting of the 16 experimental and 16 control classes was accomplished from January 24 through February 4, 1977. The surveys were administered to all classes by three project staff members.* The teachers helped to distribute pencils, answer sheets, and forms, but did not see the questionnaires until after the posttesting was completed. A standard set of instructions stated explicitly but informally was delivered to each class (see Appendix B-6). Wherever possible, students absent on the testing dates completed the forms within three days in a separate session with one of the test administrators. Within each class students were randomly given either a #5 or #7 form. Each student completed the same form before and after the treatment. The pretesting and posttesting sessions for each class each required 45 minutes. Students who needed 5 or 10 minutes more to complete their form were allowed to do so. The same precedures were used during the posttesting which occured from March 21 through April 18, 1977.

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*There was one exception. Because of scheduling and budget considerations, an assistant principal from a junior high school in one of the districts administered the surveys in one of the high school classes. The same, explicit, written instructions were given by all administrators.

The following table indicates the numbers of students who completed the same form for pretesting and posttesting.

EXHIBIT 5
Number Of Students Who Were Tested

	Experimental	Control
Pretest	363	344
Posttest	335	302

After the posttesting session, the experimental students and participating teachers completed the curriculum evaluation forms and mailed them to the Social Science Education Consortium. All 16 teachers and 325 of the experimental students completed the curriculum forms.

DATA ANALYSIS

In order to answer questions regarding general treatment effects and specific treatment effects for the entire population, for rural vs. suburban, and for social studies vs. science classes, (i.e., evaluation questions 1, 2a, 2b, 3, 4a, and 4b on pages 5 and 6), a 2 x 2 x 2 repeated measures analysis of variance (ANOVA) was employed.* The classroom was used as the unit of analysis, and the dependent variables consisted of mean classroom change scores for each cognitive and affective scale. The repeated measure in this analysis consisted of the experimental and the control classes, within teachers.

This method of analysis was chosen for several reasons. Most important, it utilizes the classroom as the unit of analysis, and is thus very conservative in controlling for classroom effects. Using mean change as the summary statistic (rather than adjusted classroom means, for example) results in relatively simple reporting, a must for such a complex set of independent and dependent variables. Analysis of covariance (using pretests as covariates) was also considered. However, an ANOVA performed on the pretest data revealed no significant differences between experimental and control groups on any of the design variables. Thus, there was no apparent need for statistically equating experimental and control groups. Although the analysis employed was quite conservative, the design resulted in considerable statistical power. This power was evidenced

*The program used was the BMD-08V.

by the fact that differences on the order of .1 to .2 standard deviation were found to be statistically significant.

The repeated measures design and effects tested in the study are provided in Exhibit 6 below:

EXHIBIT 6
Repeated Measures Analysis Design

	Variable	Abbreviation	Error Term
1.	Grand Mean[1]		T (VAS)
2.	Treatment: Values Clarification vs. Social Science Inquiry	V	T (VAS)
3.	Area: Suburban vs. Rural	A	T (VAS)
4.	Subject: Science vs. Social Studies	S	T (VAS)
5.	Students: Experimental vs. Control	X	TX(VAS)
6.	Treatment by Area	VA	T (VAS)
7.	Treatment by Subject	VS	T (VAS)
8.	Area by Subject	AS	T (VAS)
9.	Treatment by Experimental-Control	VX	TX(VAS)
10.	Area by Experimental-Control	AX	TX(VAS)
11.	Subject by Experimental-Control	SX	TX(VAS)
12.	Treatment by Area by Subject	VAS	T (VAS)
13.	Treatment by Area by Experimental-Control	VAX	TX(VAS)
14.	Treatment by Subject by Experimental-Control	VSX	TX(VAS)
15.	Area by Subject by Experimental-Control	ASX	TX(VAS)
16.	Teacher nested within Treatment by Area by Subject	T(VAS)	
17.	Treatment by Area by Subject by Experimental-Control	VASX	TX(VAS)
18.	Teacher nested within Treatment by Subject	TX(VAS)	

[1]Because the dependent variable for this analysis was mean change scores, significance on the grand mean indicates significant change for the entire population.

Because of the nature of the repeated measure analysis, the effects V, A, and S, and the interactions VA, VS, AS, and VAS confound control and experimental effects and are of little interest. Effects on X represent comparisons between experimental and control (evaluation question 1 on page 5). Interaction VX reflects differences between the two treatments (evaluation question 3).

Interactions AX and SX reflect differences in general treatment effects for suburban vs. rural and science vs. social studies (evaluation question 2a and 2b). Interaction VAX represents comparisons of the effects of the two experimental treatments on rural vs. suburban populations (evaluation question 4a), and VSX represents comparisons of the effects of the two treatments on social studies vs. science classes (evaluation question 4b). Exhibit 2 on page 7 illustrates the design. Each * in Exhibit 2 represents one classroom mean change score.

Because the independent variables of sex, prior knowledge, locus of control, and faith in human nature are individually related variables rather than classroom related variables, the analysis for these variables was of necessity different from the analysis described above. In each case, a simple one-way ANOVA with students as the unit of analysis was performed. For this set of analyses, the dependent variable in each ANOVA was student change scores in experimental classrooms only.

RESULTS

Overview

Because of the large number of independent and dependent variables in the study, many analyses were necessary. The 2 x 2 x 2 x (2) repeated measure analysis was performed on 16 dependent variables, yielding a total of 240 F tests. The one-way ANOVAs using sex, prior knowledge, faith in people and locus of control as independent variables involved 75 analyses yielding 150 F tests of interest to the study. The ANOVA tables and the associated tables of cell and strata means were sufficient to fill a two-inch thick stack of computer paper.

Because of the magnitude of the analytic results, it appears counterproductive to report all analyses in detail. Instead, the following strategy has been employed:

1. All F values with probability $\leq .10$ are presented in Table 2 (for the four-way ANOVAs) and in Table 3 (for the one-way ANOVAs). These tables are set up so the reader can see the patterns of significant results. For example, in Table 2 it can be readily seen that there was a consistent treatment effect (X) on the cognitive scale, but no other effects on the cognitive scale. Because of the large number of F tests, a certain number of type 1 errors can be expected.

TABLE 2

Significant F Values[1] From Four-Way ANOVAs On All Dependent Variables

		Cognitive Scales		Affective Scales			
	Gen Know	Energy Know	Land Use Know	Total Know	Belief Energy	Belief Env.	Value Env.
V (Values Clarification-Social Studies Inquiry)[2]							6.52**
A (Suburban-Rural)[2]							
S (Science-Social Studies)[2]							
X (Control-Experimental)	8.32**	6.36**	5.95**	19.62***	8.81**		
VA[2]		3.60*					
VS[2]							
AS[2]					4.21*		
VX							
AX							
SX							
VAS[2]							
VAX							
VSX							
ASX							
T(VAS)[2]							
VASX							
TX(VAS)							

* P ≤ .10 ** P ≤ .05 *** P ≤ .01

[1]Each F test of interest in this table had 1 and 8 degrees of freedom.

[2]All terms not containing "X" confound experimental and control effects, and are of little interest. See page __ for information regarding which questions are adressed by which F tests.

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TABLE 2 (continued)

	Affective Scales								
		Tradeoffs				Solutions			
	Ability Help	Energy	Growth	Consum	Conserv	Pol/Leg	Person.	Educ.	Life St.
V									
A	4.12*								
S				13.06**	9.17**				
X	4.48*								
VA		5.78**	6.59**		8.50**		10.45**		
VS									
AS	4.07*								
VX		6.95**							4.43*
AX									
SX									
VAS	13.50**				3.46*				
VAX		3.69*	11.28***	4.69*		7.67**	6.22**	11.06**	
VSX		4.03*			3.66*				4.99*
ASX								6.90**	
T(VAS)									
V(ASX)									
TX(VAS)									

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TABLE 3

Significant F Values and Degrees of Freedom from One-Way ANOVAs on All Scales[2]

	Gen. Know.	Energy Know.	Land Use Know.	Total Know.	Belief Energy	Belief Env.	Value Env.	Ability Help
SEX (1/158)						3.55*		
SEX X Treatment (1/158)			3.29*					
Prior Knowledge (2/157)	4.91***		2.34*	2.92*				4.10**
Prior Knowledge X Treatment (2/57)	4.43**							
Faith in Human Nature (2/157)				3.23**		5.29***		
Faith X Treatment (2/157)								
Locus of Control (2/157)							3.59**	
Locus X Treatment (2/157								

	Tradeoffs				Solutions			
	Energy	Growth	Consum.	Conserv.	Pol/Leg	Person.	Educ.	Life Style
SEX								
SEX X Treatment							5.30**	
Prior Knowledge								
Prior Knowledge X Treatment						3.32**		
Faith in Human Nature	2.90*	4.24**						
Faith X Treatment				3.03**		3.03**		
Locus of Control				2.96*				
Locus X Treatment								

[1]F values due to treatment main effects are not displayed here; treatment main effects are more appropriately addressed in the more conservative four-way ANOVAs.

* $P \leq .10$ ** $P \leq .05$ *** $P \leq .01$

[2]Change scores in the experimental classes only were used as the basis for these analyses.

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Thus, where apparently "erratic" effects appear scattered across the tables, little attention is paid to them in the reporting. On the other hand, certain clear patterns emerge across several scales, and it is highly unlikely that those patterns are due to chance. Although α was set at .05 in these analyses, presenting all Fs with $P \leq .10$ will assist the reader in finding patterns.

2. The evaluation questions are again presented, and all significant results of the anlayses including pertinent means are discussed as they apply to the evaluation questions.

3. The following sets of documentation supporting Tables 2 and 3 are found in Appendix C.

A) All ANOVA tables for the four-way analyses (Appendix C-1).

B) All classroom mean change scores analyzed in the four-way analyses (Appendix C-4).

C) All ANOVA tables and tables of means obtained in the one-way ANOVAs (Appendices C-2 and C-3).

Answers to Questions

1. Did the treatment in general (both values clarification and social science inquiry) have a significant effect when compared to no treatment (control)? (X)

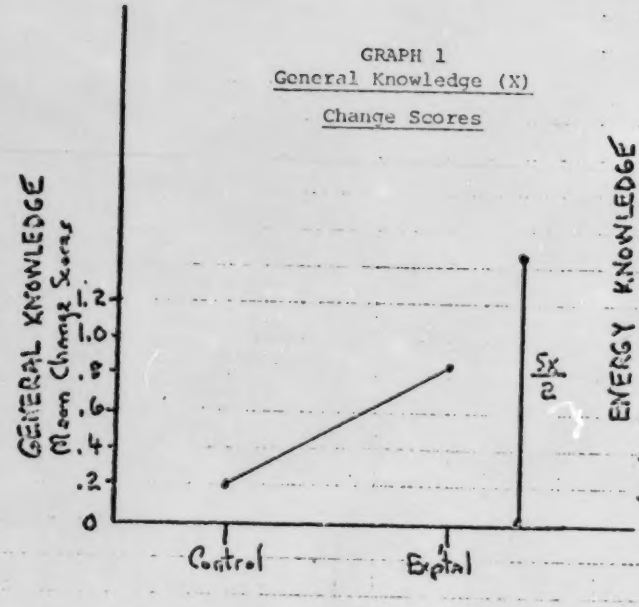
In terms of knowledge of environmental and energy issues, there was a statistically significant effect in favor of the experimental or treatment classes. On all three cognitive subtests and the total knowledge test the experimental classes' mean gain scores were significantly higher than the control classes'. The following table provides the mean change scores and F statistics on these tests:

TABLE 4
Experimental vs. Control Classes
Mean Change Scores on Knowledge Tests, and Significance Levels

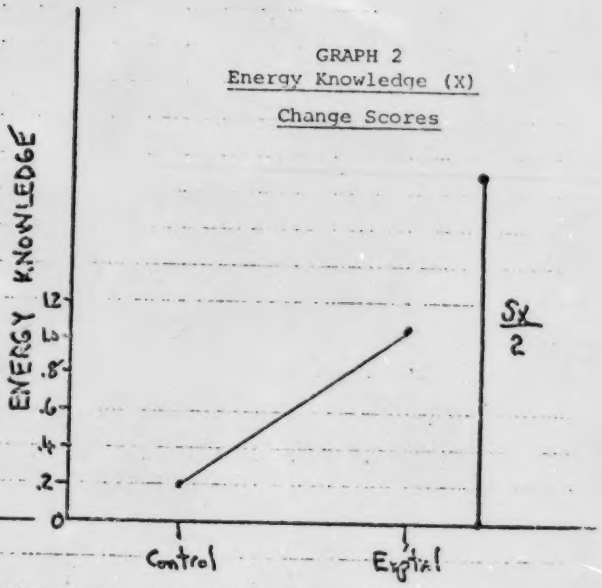
Knowledge Tests	Change Scores			Tests of Differences	
	Std Dev	Exp.	Con.	F Statistic*	Significance Level
General Knowledge	2.88	.85	.20	8.32	.05
Energy Knowledge	3.75	1.15	.19	6.36	.05
Land Use Knowledge	4.16	1.06	.30	5.95	.05
Total Knowledge	9.39	3.06	.70	19.62	.01

*F tests had 1 and 8 degrees of freedom. These results are depicted graphically in Graphs 1-4.

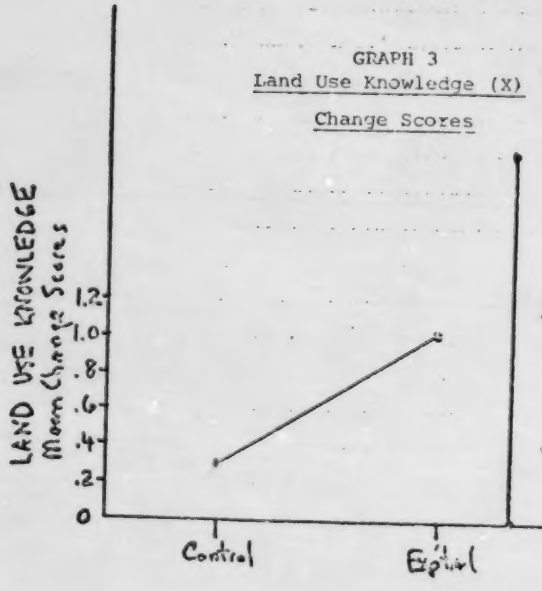
GRAPH 1
General Knowledge (X)
Change Scores



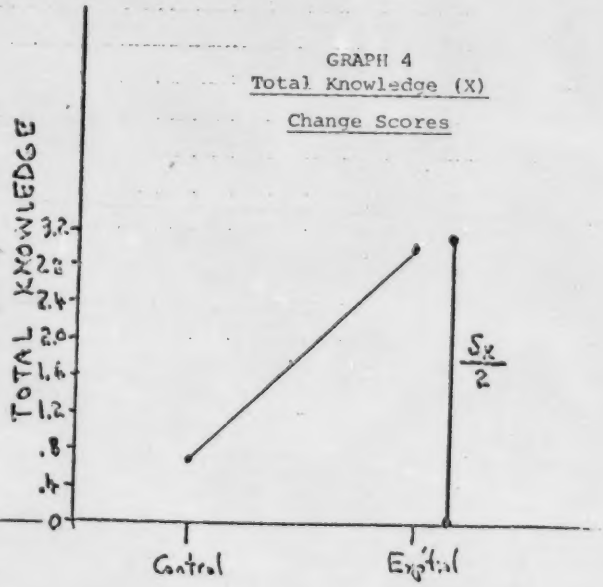
GRAPH 2
Energy Knowledge (X)
Change Scores



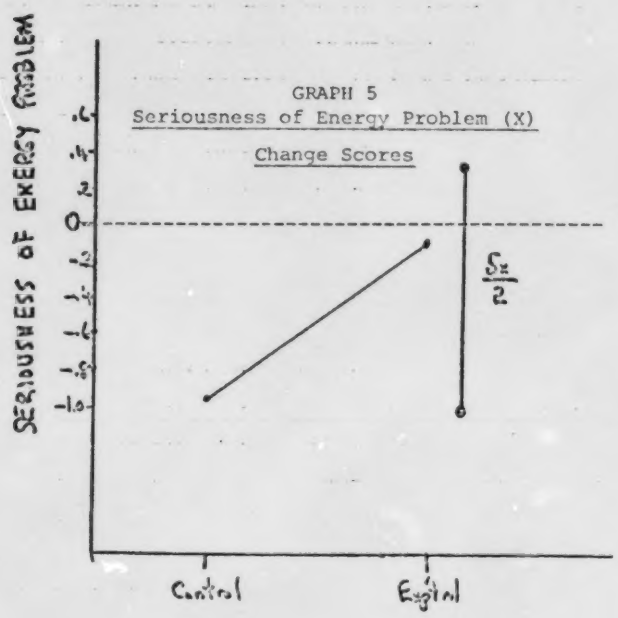
GRAPH 3
Land Use Knowledge (X)
Change Scores



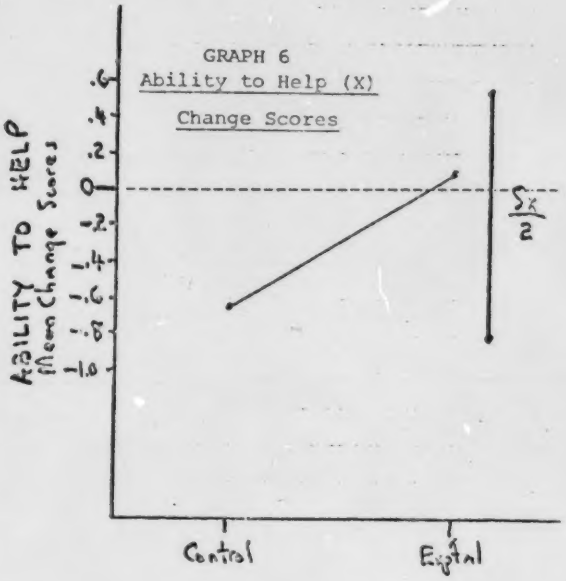
GRAPH 4
Total Knowledge (X)
Change Scores



A statistically significant difference between mean change scores of experimental and control classes occured on the belief in the seriousness and importance of the energy problem. In this case the control group moved in a negative direction while the experimental group changed very little. That is, in the opinions of the control classes, the energy problem became less serious and important at the conclusion of the project than at the beginning. This mean change score of -.95 was statistically significant when compared to the treatment mean change score of -.10. Although not significant at the .05 level, the same pattern occurred in the "ability to help" scale, that is, the control group also felt less able to help solve energy/environmental problems after the project than before. The difference between their mean change score of -.63 and the experimental mean change score of .09 was significant at the .10 level. Graphs 5 and 6 illustrate these two results.



GRAPH 5
Seriousness of Energy Problem (X)
Change Scores



GRAPH 6
Ability to Help (X)
Change Scores

As indicated above, both differences are approximately 1/3 of a standard deviation in magnitude. The following table provides information on the analyses of variance for all 12 attitude scales.

TABLE 5

Results On Attitude Scales--Experimental vs Control Classes

Attitude Scales	Standard Deviation	Average Mean Scores		Test of Differences	
		Experimental	Control	F Test	Level
Seriousness of Environmental Problem	4.18	.34	-.26	.92	N.S.
Seriousness of Energy Problem	2.63	-.10	-.95	8.81	.05
Valuing the Environment	2.24	-.08	-.48	1.44	N.S.
Ability to Help	2.71	.09	-.63	4.48	.10
Energy Tradeoff	3.81	-.28	.15	3.31	N.S.
Growth Tradeoff	2.53	.10	-.10	1.35	N.S.
Consumption Tradeoff	3.32	-.02	.15	.54	N.S.
Conservation Tradeoff	2.23	-.07	-.19	.18	N.S.
Political/Legal Solutions	4.67	1.10	.44	2.08	N.S.
Personal Solutions	5.39	.23	-.33	.14	N.S.
Education Solutions	1.68	.06	-.06	.46	N.S.
Life Style Solutions	1.63	.26	-.01	2.87	N.S.

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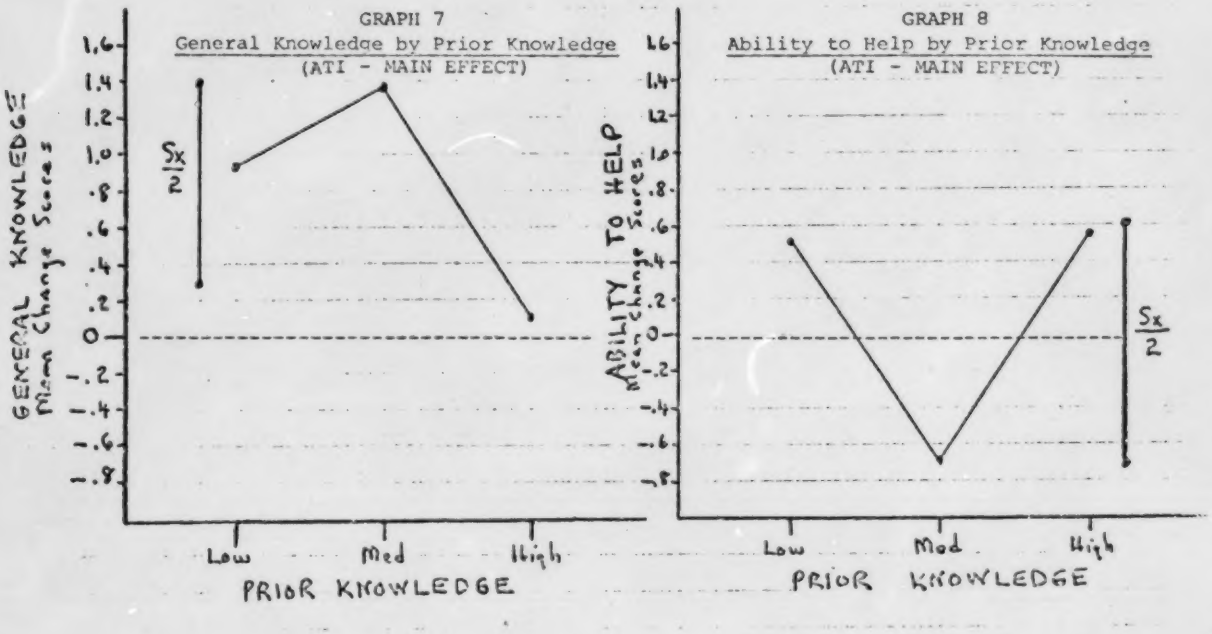
2. When compared to no treatment (control groups), did the treatment in general have significantly different effects on specific populations of students?

There were no significantly different treatment effects on any of the dependent variables (knowledge tests and attitude scales) for any of the following groups: suburban vs. rural classes (AX), social studies vs. science classes (SX), and male vs. female students. There were a few isolated differences of treatment effects for students varying in their prior knowledge of enviornmental and energy issues, internal locus of control, and faith in human nature. Some of these effects probably occurred by chance since a large number of analyses (48) were run on these personological variables. Several of these effects are presented below.

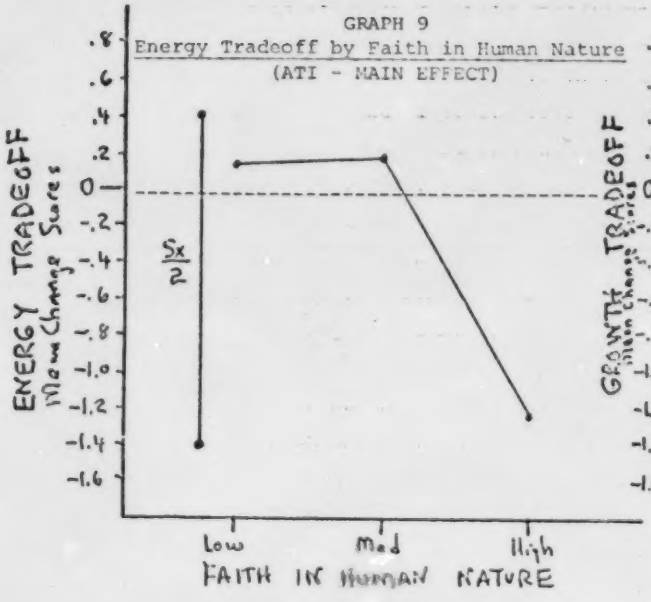


Two statistically significant effects occurred among students with a low, medium, and high prior knowledge of environmental and energy issues. There was a significant difference ($P \leq .01$) among the mean change scores of these three groups on their general knowledge of environmental issues. Graph 7 presents those results which occurred primarily because of the little gain of the high group.

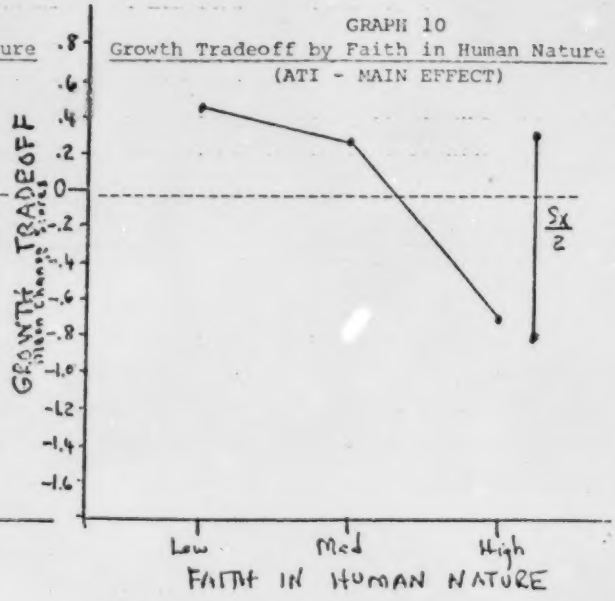
This effect cannot be attributed to any "ceiling" effect, as the distribution of scores was quite normal, with no apparent ceiling. Neither can it all be attributed to a regression effect. The prior knowledge groups also differed ($P \leq .02$) on their mean change scores on perceived ability to help solve environmental/energy problems. In this case students with low and high prior knowledge scores gained on their feelings of ability to help, while the medium prior knowledge students declined on that variable. (See Graph 8.)

Two effects occurred on two of the tradeoff scales (only one significant at the .05 level) among students with a low, medium, and high faith in people. In both cases students with a high faith in human nature moved away from protecting and enhancing the environment and toward developing new energy resources ($P \leq .06$) and economic growth ($P \leq .02$), while the low and medium faith in people students registered little change. Graphs 9 and 10 illustrate these results.

GRAPH 9
Energy Tradeoff by Faith in Human Nature
(ATI - MAIN EFFECT)

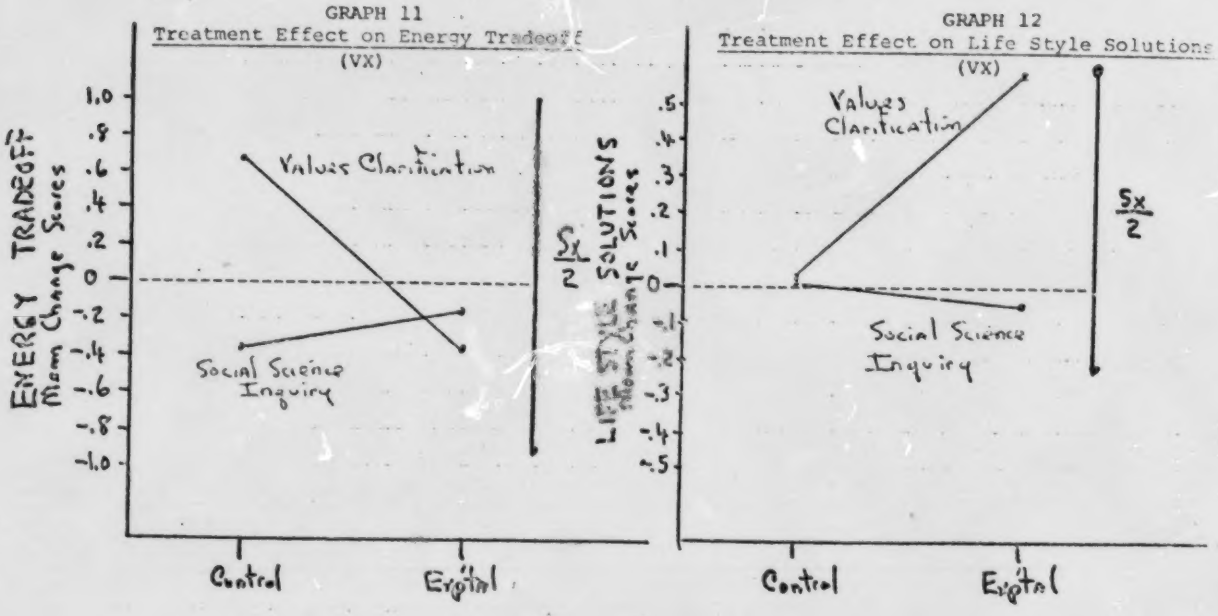


GRAPH 10
Growth Tradeoff by Faith in Human Nature
(ATI - MAIN EFFECT)



3. Were there significant differences in the effects of the two treatments (values clarification and social science inquiry) for the population in general? (VX)

There were no statistically significant differences in the effects of the two treatments for the population in general on any of the knowledge subtests. Significant differences ($P \leq .05$) in the treatment effects occurred on only two of the twelve attitude scales--energy tradeoff and life style solutions. The graphs of those two effects are presented below (Graphs 11 and 12). Since there were no other attitudinal effects these results may have been due to chance.



4. Were there any significant differential effects between the two treatments for specific populations of students?

Although no differences occurred on the knowledge tests, there were significantly different effects ($P \leq .05$) between the values clarification and social science inquiry treatments on four of the twelve attitude scales for suburban vs. rural classes (VAX). These scales were: growth tradeoff ($F = 11.27$)**, political/legal solutions ($F = 7.69$)*, personal solutions ($F = 6.21$)*, and educational solutions ($F = 11.06$)*. The differential effects on two other scales, energy

*$P \leq .05$

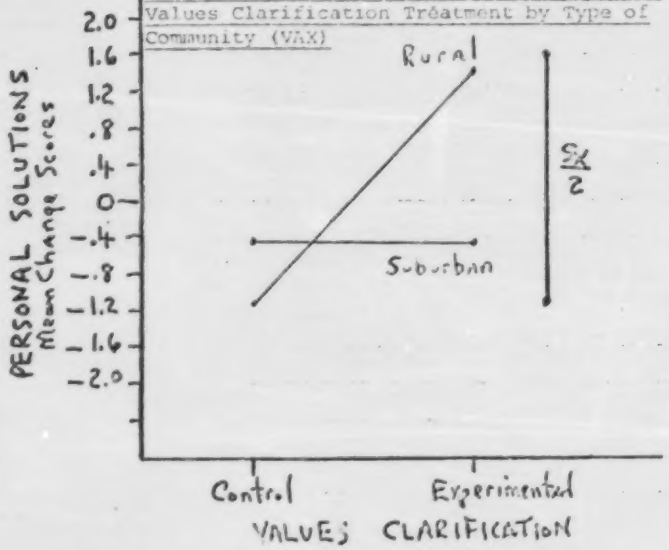
**$P \leq .01$

tradeoff (F = 3.69) and consumption tradeoff (F = 4.69), were significant at the .10 level.

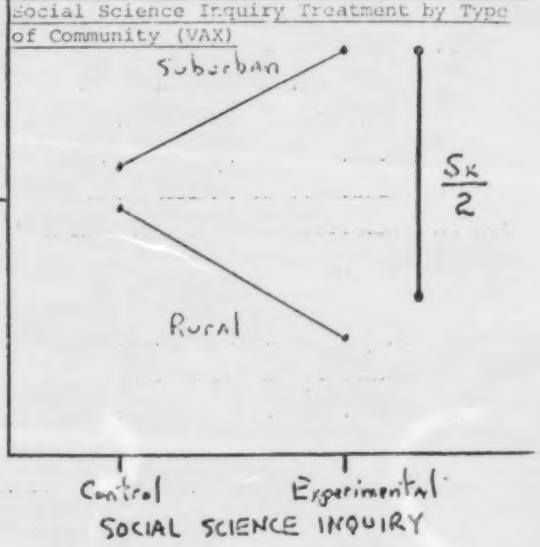
The same pattern occurred on each of these six scales. In the values clarification treatment, the rural classes moved toward protecting the environment and adopting certain legal, educational, and personal solutions while the suburban classes moved toward growth, consumption, and energy development and away from those legal, educational, and personal solutions. In the social science inquiry treatment the opposite trend occurred. The suburban classes moved toward protecting the environment and adopting those solutions, while the rural classes moved toward energy and growth and away from the political, educational, and personal solutions. Graphs 13-24 depict this type of community by treatment interaction effect and indicate that the magnitude of the differential effect is in the range of one-half standard deviation on most of the scales.

Except for the life style solutions scale, there were no significant differential effects between the two treatments on any of the knowledge tests or attitude scales for science vs. social studies classes. There were a few scattered significant differential effects for the other variables--sex, prior knowledge of environmental/energy issues, locus of control, and faith in human nature. There was, however, no consistent pattern. Moreover, as Table 3 indicates, those effects are likely to have occurred by chance due to the large number of interaction effects examined.

GRAPH 13
Treatment Effect on Personal Solutions for Values Clarification Treatment by Type of Community (VAX)

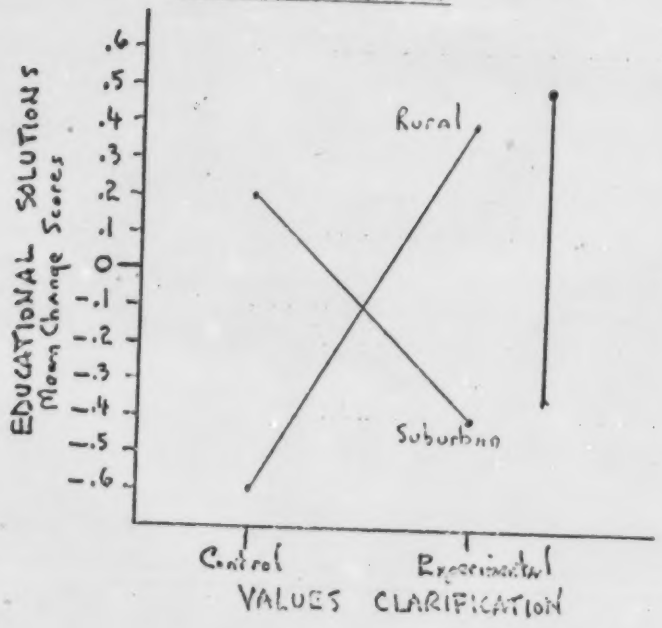


GRAPH 14
Treatment Effect on Personal Solutions for Social Science Inquiry Treatment by Type of Community (VAX)



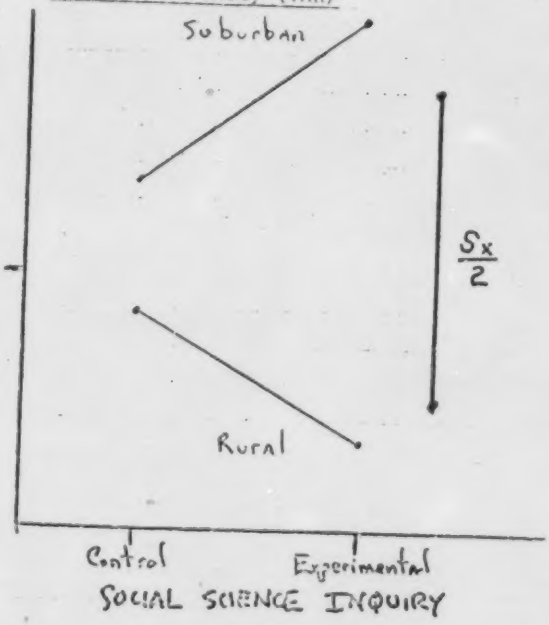
GRAPH 15

Treatment Effect on Educational Solutions for Values Clarification Treatment by Type of Community (VAX)



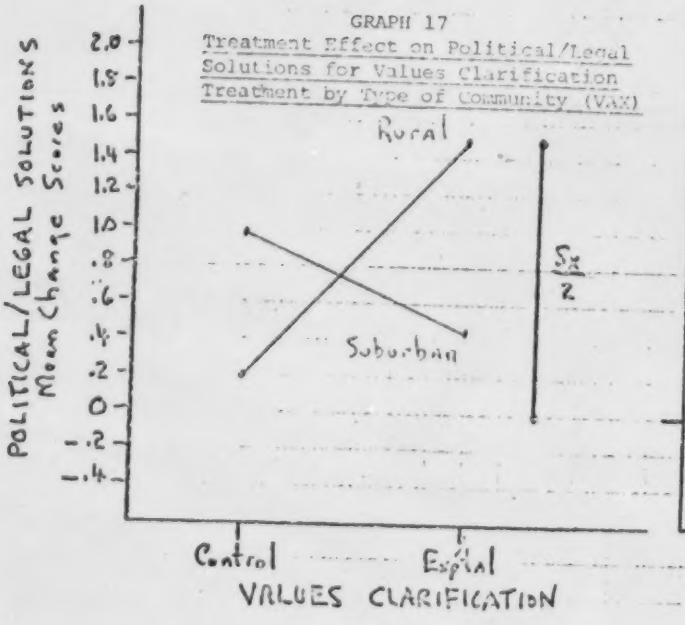
GRAPH 16

Treatment Effect on Educational Solution for Social Science Inquiry Treatment by Type of Community (VAX)



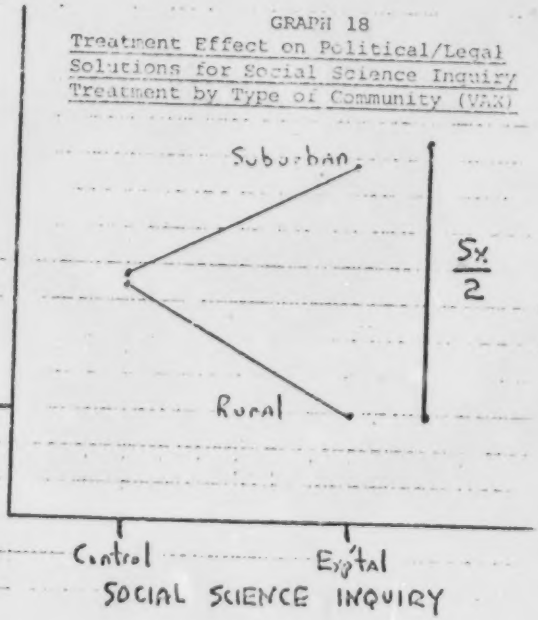
GRAPH 17

Treatment Effect on Political/Legal Solutions for Values Clarification Treatment by Type of Community (VAX)



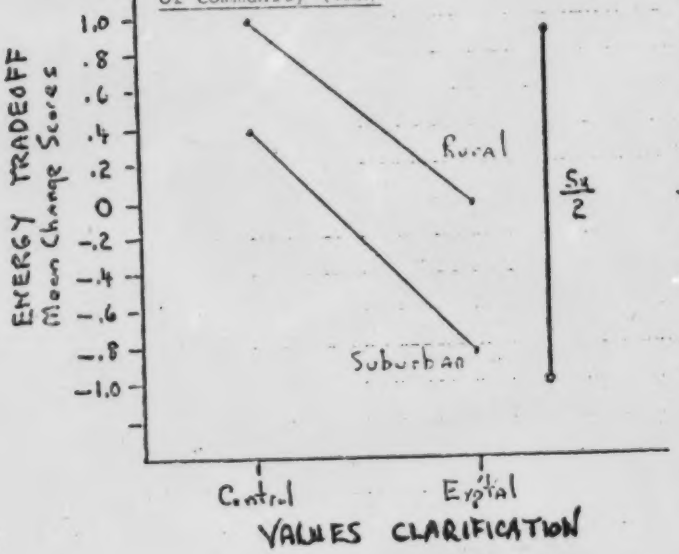
GRAPH 18

Treatment Effect on Political/Legal Solutions for Social Science Inquiry Treatment by Type of Community (VAX)



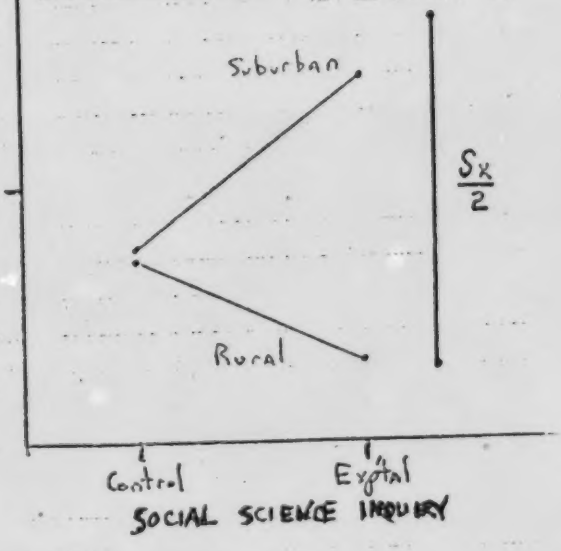
GRAPH 19

Treatment Effect on Energy Tradeoff for Values Clarification Treatment by Type of Community (VAX)



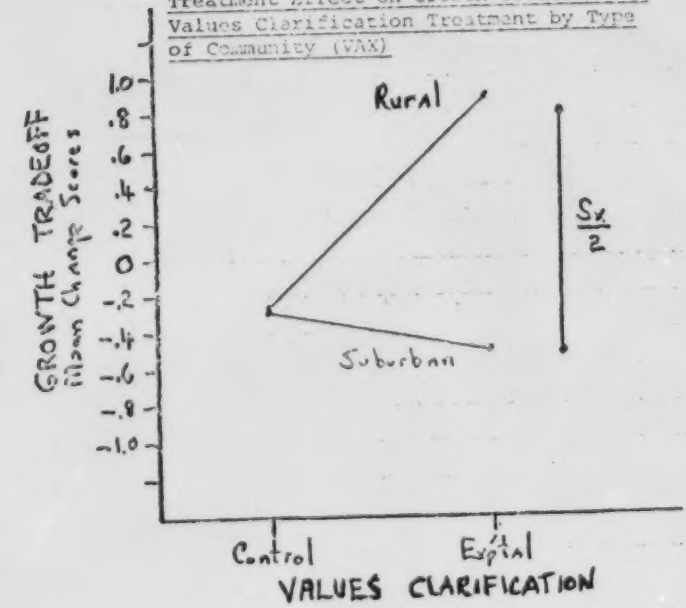
GRAPH 20

Treatment Effect on Energy Tradeoff for Social Science Inquiry Treatment by of Community (VAX)



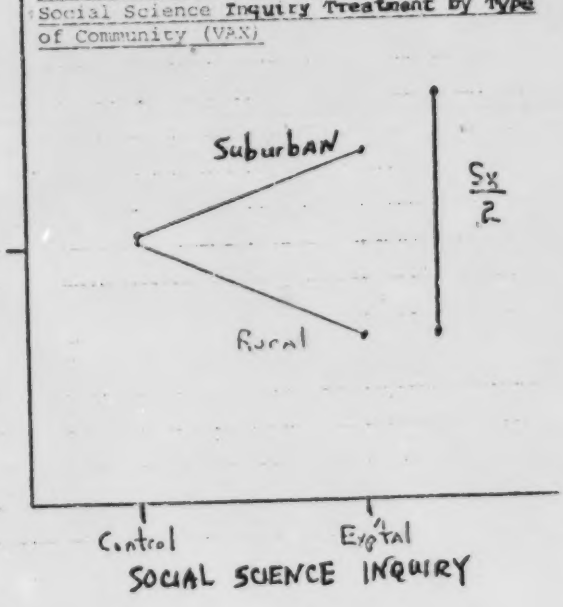
GRAPH 21

Treatment Effect on Growth Tradeoff for Values Clarification Treatment by Type of Community (VAX)



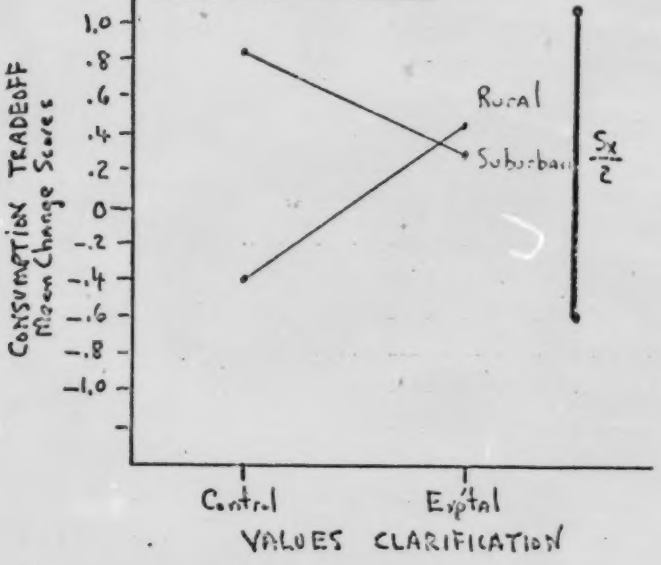
GRAPH 22

Treatment Effect on Growth Tradeoff for Social Science Inquiry Treatment by Type of Community (VAX)



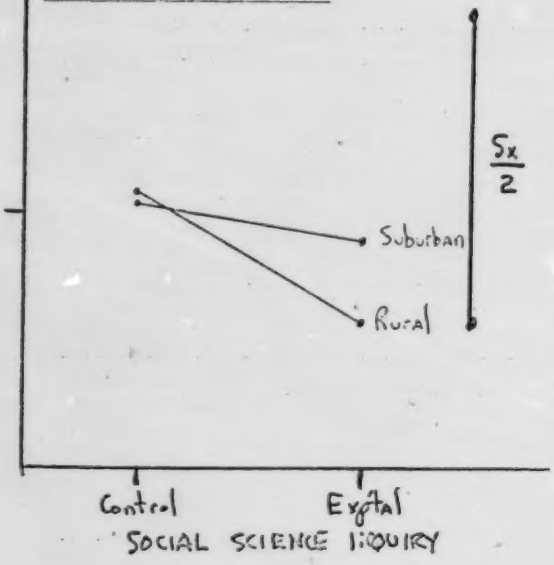
GRAPH 23

Treatment Effect on Consumption Tradeoff for Values Clarification Treatment by Type of Community (VAX)



GRAPH 24

Treatment Effect on Consumption Tradeoff for Social Science Inquiry Treatment by Type of Community (VAX)



Teacher and Student Evaluations of the Books

Generally, the results of the participating teacher and student evaluations indicated that both Spaceship Earth and Environmental Crisis/Energy Crisis were thought to be useful and stimulating environmental education books but that they lacked detailed information and facts on environmental issues. The specific results are presented below.

Teacher Evaluation Results

All sixteen teachers completed a written form with seven Likert items and three open-ended questions designed to elicit their critical comments concerning the books they used. Spaceship Earth and Environmental Crisis/Energy Crisis received very similar and generally positive evaluations from the teachers who used the books in the study. For both texts the teachers agreed or strongly agreed that: the readings were "clearly written and appropriate for [their] grade level" (which was usually grades 10 and 11) and the questions and activities stimulated their students' thinking, learning, and interest in environmental issues and concepts. The teachers did not, however, believe that

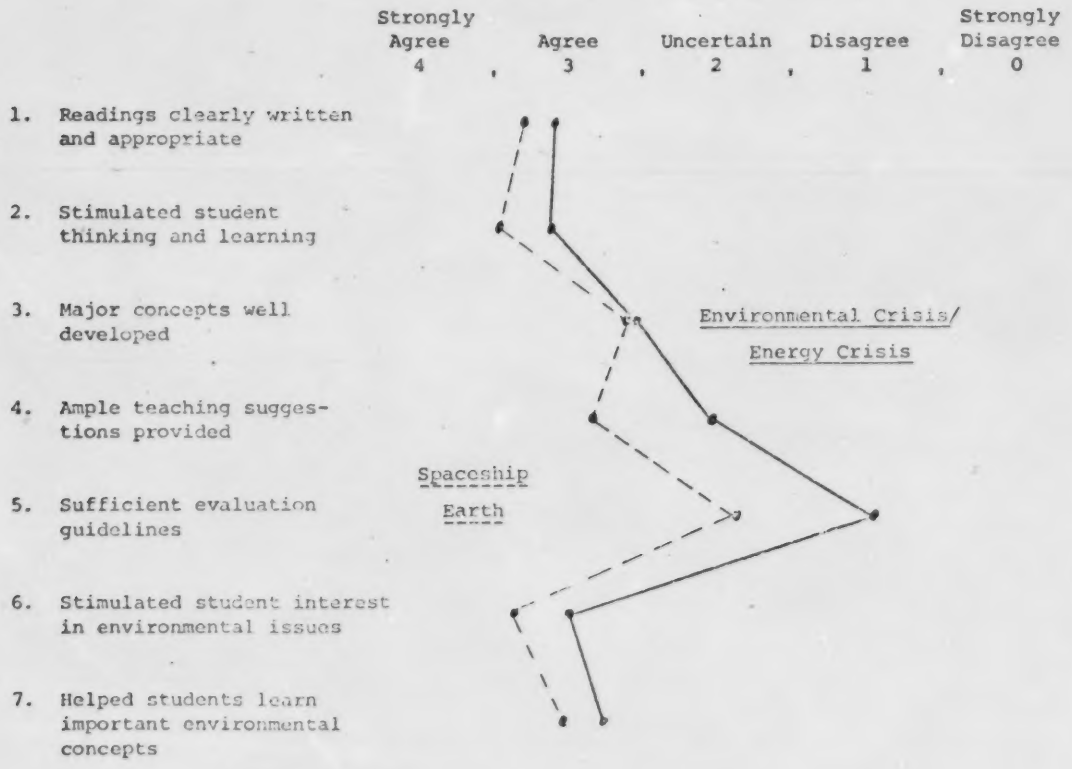
the books provided "sufficient guidelines or procedures to evaluate student progress." Six of the eight teachers who used Spaceship Earth felt that there were "ample teaching suggestions...provided either in the student text or teaching guide." Concerning the EEC books, four teachers agreed and four disagreed that "ample teaching suggestions" were provided. The teacher's guide for that series was in the process of revision and not available at the time of the study.

As Graph 25 indicates, Spaceship Earth received slightly or somewhat more positive ratings from the teachers than did Environmental Crisis/Energy Crisis.

GRAPH 25

Teacher Curriculum Evaluation Results

Average Mean Score for the Two Treatments*


Strongly Agree 4
Agree 3
Uncertain 2
Disagree 1
Strongly Disagree 0
1. Readings clearly written and appropriate
2. Stimulated student thinking and learning
3. Major concepts well developed
4. Ample teaching suggestions provided
5. Sufficient evaluation guidelines
6. Stimulated student interest in environmental issues
7. Helped students learn important environmental concepts
Environmental Crisis/ Energy Crisis
Spaceship Earth

*This is not a weighted average.

On the open-ended questions five of the Spaceship Earth teachers mentioned that they liked the inquiry and case study approach of that book. Three teachers liked its presentation of environmental issues as complex and real. Each of the following was mentioned by one teacher as something they liked about Spaceship Earth: its readability, high interest, challenging, adaptability, the Epilogue, the clear set of role-playing exercises, and the questions and activities which forced students to examine their own values and take a stand.

On the negative side, four teachers believed that the book lacked detailed background information and facts on the environmental issues depicted in the case studies. Two teachers thought the book was biased toward the environmentalist perspective and two others did not dislike anything about the book. One teacher believed that it lacked "a world view."

Under recommendations for use, two science teachers indicated the book would be a good supplemental text for science classes. The following were other suggestions for use, each mentioned by one teacher: "Spend an entire nine weeks on it," "plan extensively" and "involve students," use the "small group discussion mode," "utilize the daily newspaper," "utilize a greater variety of approaches and techniques than suggested in the book." (Tabulations of the results of this form for Spaceship Earth are provided in Appendix C-6.)

On another form teachers were asked to list the two best articles and the poorest article in the books and to explain why. There was some agreement as to best and poorest articles among the Spaceship Earth teachers. Three teachers liked "Coastal Zoning: A Role-Playing Case" as the best section. "Energy and Its Use" and "The Energy Crisis: Power for the People" were each identified by two teachers as their first or second choices. Three teachers identified "Barefoot in the Sand" as the weakest article. Each of the other articles listed on the best and poorest list were mentioned by only one teacher. See Appendix C-8 for a complete list of these results with reasons why the articles were chosen as best or worst.

The Environmental Crisis/Energy Crisis teachers mentioned several things that they liked about those books. Each of the following specific aspects were mentioned by at least two teachers: the length of the readings, the questions at the end of chapters, the activities for involvement, and the presentation of a variety of viewpoints. One teacher liked the organization of the book.

Two teachers did not dislike anything about Environmental Crisis/Energy Crisis. Four teachers, however, believed that the books lack depth and factual data on the issues. Each of the following comments were made by one teacher: the vocabulary and reading level were inconsistent, some aspects were dated, it needed more of a science orientation and more student involvement, and the "overall organization was awkward."

Three teachers recommended that a teacher's guide be provided. One teacher each mentioned these other suggestions for revision or use: use as a supplement, provide more information and activities, teach at a time when field trips are possible (i.e. fall and spring), create vocabulary lists, and put all the articles dealing with one topic in the same section of the book. The books are organized around the elements of the inquiry process--nature of problem, causes, effects, and solutions. (The tabulations of teacher responses on this form for the Crisis books are provided in Appendix C-7.)

On the "best and worst articles" form there was a wide disparity of choices among the teachers using Environmental Crisis/Energy Crisis. Eighteen different articles were listed as the two best by those eight teachers (some teachers provided three articles). In addition, each teacher listed a different article as the weakest. Five of the readings on the poorest list were also on the best list. (See Appendix C-8 for a complete list of those articles and the reasons why the teachers selected them.)

Student Evaluation Results

Generally the majority of the students in the study seemed to like Spaceship Earth and Environmental Crisis/Energy Crisis to a moderate extent. The students in both treatments agreed that their book helped them "learn some new things about today's environmental problems." They also would recommend the book to other students. The Spaceship Earth students did not think their "book was very difficult to read and understand." Most of the EEC students also agreed with that assessment for their books, although more students were uncertain than in the Spaceship classes. Over 64 percent of the students in both treatments agreed or strongly agreed that their "book was interesting and enjoyable to read." One class in each of the two treatments gave the books a substantially lower rating than the students in the other seven classes. In one Spaceship

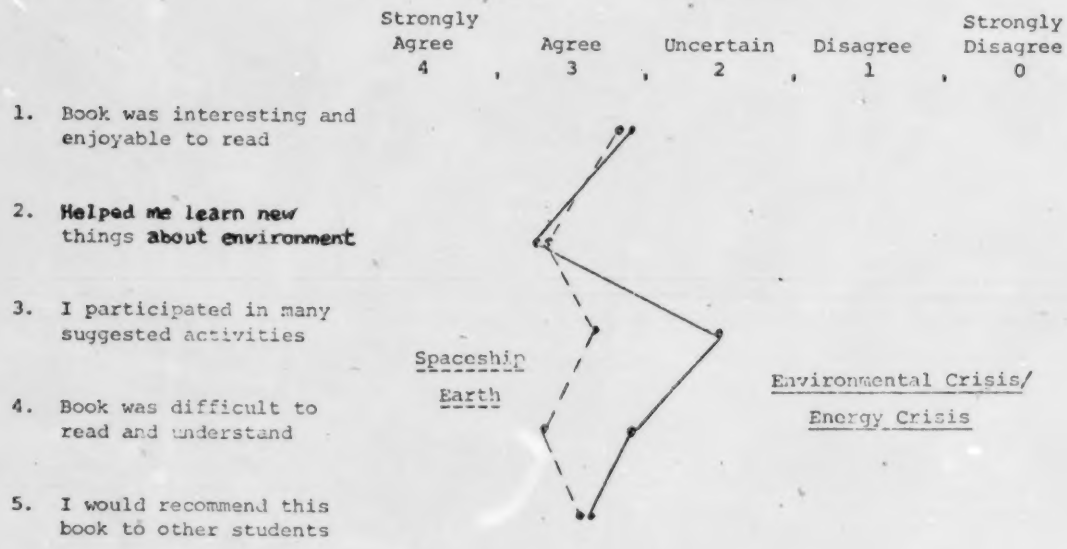
Earth class only 24 percent of the students, for example, thought the book was interesting and enjoyable. In one EEC class that percentage was 31 percent. The average in the other classes was about 75 percent.

Graph 26 summarizes the classroom averages on the rating forms for the two books. (The mean is not a weighted average but merely an average of the eight classroom mean scores for each book.)

GRAPH 26

Student Curriculum Evaluation Results

Average Mean Score for the Two Treatments*


Strongly Agree 4
Agree 3
Uncertain 2
Disagree 1
Strongly Disagree 0
1. Book was interesting and enjoyable to read
2. Helped me learn new things about environment
3. I participated in many suggested activities
4. Book was difficult to read and understand
5. I would recommend this book to other students
Spaceship Earth
Environmental Crisis/ Energy Crisis

*This is not a weighted average.

The written comments of the students on the open-end questions (158 students) supported the rating scale data. When asked what they liked most about Environmental Crisis/Energy Crisis, 19 or more students said that the books were "informative," "factual," and "interesting" and they make "you realize the problems." Ten students liked the short readings, the variety of articles, and the illustrations. Thirty-five students said that there was not anything that

they disliked about the books. On the other hand, 15 students indicated they were boring and 13 said they couldn't understand them very well. These positive and negative responses were distributed fairly evenly among the classrooms except that ten of the students who said the books were boring came from two classes (a social studies and science class).

On the open-ended section of the survey (197 students), the most frequently mentioned positive comments about Spaceship Earth were that it presented real current problems (stated by 42 students), good discussions developed (31 students), it was easy to read and understand (27 students), and it made you think (23 students). These positive responses were distributed evenly among the eight classes. Thirty-five students indicated there was nothing they disliked about Spaceship Earth. Fourteen of those students were in the same suburban science class. Thirty-five students indicated that sometimes it was one-sided. Eleven of those responses came from one rural science class. Twenty-one students said it needed more information (ten students were from one suburban science class) and 17 students said it was boring (eleven from two classes--a suburban science and rural social studies class). A complete list of responses from two or more students on both Spaceship Earth and Environmental Crisis/ Energy Crisis is provided in Appendix C-9.

SUMMARY AND DISCUSSION

The following is a summary and brief discussion of the results presented above:

1. The environmental education treatments taken together (both values clarification based on the use of Deciding How to Live on Spaceship Earth and social science inquiry based on The Environmental Crisis and The Energy Crisis) produced statistically significant cognitive gains when compared to the control classes. This occurred on three subtests focusing on land use, energy, and general environmental issues and on the total knowledge test. In terms of educational significance, the differences between the experimental and control classes were in the range of ½ standard deviation. These gains seem substantial when compared to gains which occur in other subject areas. For example, typical gains in reading achievement at the junior high level average about ½ standard deviation for a full year. It was surprising to the investigators that more change occurred on the cognitive scales than on the affective scales, as both books dealt more with attitudes than with content. A large number of students and eight of the participating teachers agreed that the books were very limited in factual information. The staff members also reached that conclusion.

Why then did students using those books learn more than the control students? Most of the teachers stated that they introduced many facts and concepts in the discussions which were stimulated by the readings. The results on the cognitive tests tend to confirm that this helped students learn. These cognitive results may also provide some evidence that students do learn facts when they use process-oriented materials (in this case values clarification and social science inquiry processes).

The environmental education treatments taken together produced a statistically significant attitude change on only one of 12 scales for the experimental classes when compared to the control classes. Thus, despite the fact that the books used in both treatments stressed opinions, attitudes, (Energy Crisis and Environmental Crisis), and value issues (Spaceship Earth), the treatments in general resulted in very few affective changes. The cognitive gains discussed above were much more consistent and larger in magnitude (in terms of standard scores). One explanation

for this result probably is the short length of time of the treatment. Six weeks is sufficient time for producing knowledge gains, but may be too short to expect significant changes in attitudes. Another possible explanation is that the attitudinal changes were hidden by some treatment interaction effects. There is some evidence that this occurred. (See the discussion of 4. below).

The one scale on which a significant difference between experimental and control classes occurred was the belief in the seriousness and importance of the energy problem. Because of the specific period of time during which this study occurred, this variable may be important despite the fact that it was only one of 12 examined. The control classes moved in the direction of believing the energy problem less serious and less important, while the experimental classes' beliefs did not change. The pretest sessions occurred at the heighth of the winter of 1977 energy crisis, while the posttest sessions were in the spring. The treatments then seem to have counteracted the effects of history on the experimental students. Students who otherwise might not have remained concerned about energy problems after the energy crisis, maintained their belief in its seriousness and importance even after the winter shortage had dissipated.

2. For treatment in general, there were no significantly different treatment effects on the various groups of students examined, including suburban vs. rural classes, social studies vs. science classes, and male vs. female students. A few isolated differences were found between different levels of students according to prior knowledge of environmental issues, faith in human nature, and locus of control. These were scattered with no consistent pattern. These results may have been due to chance, as a large number of analyses were conducted.

3. The two treatments - values clarification based on Spaceship Earth and social science inquiry based on Environmental Crisis and Energy Crisis - produced significantly different effects on only two attitude scales and on none of the knowledge tests. The participating students and teachers did like Spaceship Earth slightly more than the other two books. Thus, despite the difference in approach of the two treatments and the attitude of the participants to the books, there was very little difference on the student cognitive and affective outcomes examined. It should, however, be emphasized that a number of important variables were not studied including value analysis and decision making skills. The two statistically significant differences which did occur

were energy vs. environment tradeoff and lifestyle solutions. Inspection of the first effect reveals that it was quite small (less than .05 S_x). The latter effect, however, was in the range of .4 standard deviation, and could also be directly related to the treatment. Spaceship Earth, which scored a gain on this variable, places a strong emphasis on the importance of lifestyle commitments. This was probably responsible for those students supporting lifestyle changes as solutions to environmental/energy problems.

4. The effects of the two treatments did differ significantly on four attitude scales for suburban vs. rural classes. Those scales were the growth tradeoff, political/legal solutions, personal solutions, and educational solutions scales. Effects on two other scales - energy tradeoff and consumption tradeoff - were not significant at the .05 level, but the same pattern occurred on these six scales. In the values clarification treatment, the rural classes moved toward protecting the environment and adopting certain legal, educational, and personal solutions while the suburban classes moved toward growth, consumption, and energy development and away from those legal, educational, and personal solutions. In the social science inquiry treatment the opposite trend occurred. The suburban classes moved toward protecting the environment and adopting those solutions, while the rural classes moved toward energy and growth and away from the political, educational, and personal solutions.

This result is difficult to explain. The textbooks do not appear to be more or less geared to suburban or rural settings. Perhaps this effect was due to another difference in the two treatments. The values clarification (Spaceship Earth) treatment emphasized openended dilemmas, discussions of values issues, and personal decision making. The social science inquiry treatment made heavy use of opinionated articles on various environmental and energy issues. An attempt was made by the project staff to balance the readings used in terms of their expressed viewpoints. One of the books did, however, contain many pro-environmentalist articles. Thus, perhaps, the values clarification classes were allowed to make open-ended decisions. Perhaps, the rural classes made choices based on their closeness to the environment, while suburban classes made their choices based on their perceived needs for energy, jobs, etc.

It is difficult, however, to explain why the social science inquiry classes

had the opposite reactions.

Except for a few isolated cases, there were no other treatment interaction effects on any of the other variables examined.

The following conclusions seem justified based on these results:

1. A six-week unit of environmental education based on a process rather than content book of short readings can help rural and suburban high school students make significant gains in facts and concepts related to environmental and energy issues.

2. Such a six-week unit is not very effective in producing significant changes in those students' attitudes toward the environment and toward energy issues.

3. Such a six-week unit with a major focus on energy issues may be helpful in producing an increase (relative to no treatment) in rural and suburban high school students' awareness of the seriousness and importance of energy problems.

4. A six-week unit of environmental education based on a process-oriented book of short readings led to about the same effects in rural and suburban settings, in social studies and science classes and with female or male students. In addition, no differences occurred based on student levels of prior knowledge about environmental/energy issues, locus of control, or faith in human nature.

5. Generally, a six-week environmental education unit based on a values clarification-oriented book of readings, such as Deciding How to Live on Spaceship Earth, and a unit based on a social science inquiry-oriented book, such as The Environmental Crisis or The Energy Crisis, did not differ in their effects on high school students' gains in knowledge of environmental/energy issues or student attitudes toward these issues. One specific exception, however, was that the unit based on a values clarification oriented text which stresses the importance of making decisions concerning lifestyle commitments, (Spaceship Earth) was significantly more effective than a social science inquiry text which does not stress that in increasing students' belief in the importance of certain lifestyle solutions to energy/environment problems (eg. consuming less goods and living closer to work).

6. A six-week environmental education unit based on a values clarification-oriented book, such as Spaceship Earth, may help rural high school students increase their belief in the importance of protecting the environment (at the expense of economic growth and energy development) and increase their support for certain political/legal, educational, and personal solutions to energy/

environmental problems, but have no effect or the opposite effect on suburban students (more support for energy and growth and less support for those solutions). On the other hand, a unit based on a social science inquiry approach, such as The Energy Crisis and The Environment Crisis, may help suburban high school students increase their support for protecting the environment and for these specific solutions while causing rural students to move in the opposite direction - toward growth and energy development and less support for these solutions.

7. Generally, there was no difference between such a values clarification unit and a social science inquiry unit in terms of their effects in social studies or science classes, with female or male students, or with different groups of students based on various levels of prior knowledge of energy/environment issues, locus of control, or faith in human nature.

A number of different kinds of research studies seem necessary and important in order to clarify and extend the findings of this effort. A replication of this study with different values clarification and social science inquiry texts would help to confirm whether or not the differential effects on rural and suburban classes were peculiar to the books used in this study or common to books reflecting those two approaches. Replication studies might also include several of urban classes to determine the effects of these approaches to environmental education in that setting. If this is confirmed, an indepth case study probing for possible reasons would be helpful.

Similar research efforts in environmental education might compare two or more values education approaches such as moral reasoning, value analysis, values clarification, and inculcation. These efforts might focus on the general approaches (with inservice training to insure that teachers are able to use those approaches) rather than specific published materials as this study did. A slightly different study might compare the relative effectiveness of a process-oriented unit vs. a content-oriented unit containing many facts and concepts related to environmental issues.

All of the studies suggested above should incorporate a few personological (eg. locus of control) or sociological (eg. type of community) variables believed to be related to the instruction. This would help to further efforts to discover the methods and models which are most effective with different groups of schools and students. Different dependent variables should also be examined such as value analysis and decision making skills.

Finally, research comparing the relative effectiveness of different values education approaches on various types of students and schools would be a fruitful focus of evaluation in areas other than environmental education, such as career education, ethnic studies, women's studies, and legal or citizenship education.

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APPENDIX A: DATA GATHERING INSTRUMENTS

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U.S.O.E. Grant No. G00-7602039

APPENDIX A-1

ENVIRONMENTAL KNOWLEDGE SURVEY

Social Science Education Consortium
855 Broadway
Boulder, Colorado 80302

January 1977

ENVIRONMENTAL SURVEY

Directions

Read each item and choose the response which you believe provides the best answer to the question or the statement. Then blacken the appropriate space on the answer sheet.

1. In the United States, the greatest source of air pollution is

   A. industrial activities
   B. solid waste disposal
   C. burning of fuel to heat buildings
   D. motor vehicles

2. Over the past twenty years, the biggest source of pollutants in southern California smog has been the

   A. processing of crude oil at refineries
   B. burning of gasoline in automobile engines
   C. operation of jet airplanes
   D. burning of solid wastes

3. Which is the source of most of the world's oxygen?

   A. trees and other forest plants
   B. natural grasslands and farm pastures
   C. tiny plants near the surfaces of oceans
   D. plants, such as seaweed, growing at the bottoms of the oceans

4. Man adapts to a new environment

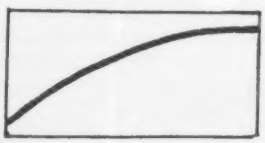
   A. by changing genetically
   B. by cultural adaptations
   C. by extrasensory perception
   D. by not changing

5. A plant is eaten by an insect which is then eaten by a trout. The trout is then eaten by a man. This is an example of

   A. a food chain
   B. natural selection
   C. mitosis
   D. osmosis

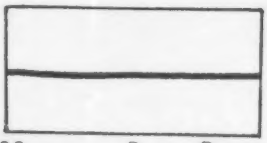
6. Which graph best shows the world's population since 1800?

A.



B.

C.



D.

7. Pollution was less a problem in rural areas of the United States 150 years ago than it is today, even on a per capita basis. This is mainly because

   A. agriculture was limited to the Eastern Seaboard
   B. people were more careful with their waste products
   C. much of the trash was burned and therefore not allowed to accumulate
   D. natural systems could absorb the waste of a smaller population

8. The most basic thing one can do to reduce the pollution from his or her automobile is to

   A. drive slowly
   B. change oil frequently
   C. keep his or her car "in tune"
   D. use high test gasoline

9. A senator who is concerned with the environment would most likely support a bill to

   A. develop large transport airplanes
   B. improve the efficiency of long-distance railroad transportation
   C. prohibit a long-distance truck to tow more than one trailer at a time
   D. add to the existing Interstate Highway System

10. To an environmentalist, which is the least desirable effect of the Interstate Highway System?

    A. good roads produce a desire for more privately-owned automobiles
    B. building the roads produces more jobs
    C. the roads permit easy travel from place to place
    D. using gasoline taxes to finance the construction discriminates against the individual motorist.

11. Which characteristic of DDT makes it environmentally dangerous?

    A. it lasts a long time in the air or on the ground
    B. it causes high death rates among farmers
    C. it rarely controls the pests for which it was intended
    D. it lowers the resistence of certain insects to other poisons

12. "Black lung" is a disease associated with

    A. cigarette smoking
    B. coal mining
    C. living in cities
    D. working in an oil refinery

13. What happens to the number of different varieties of fish in a stream as the pollution in the stream increases?

    A. it increases due to the addition of "trash fish"
    B. it remains the same, but with fewer fish of each variety
    C. it remains the same, but the varieties change
    D. it decreases

14. In the long run, which is the largest potential source of energy?

A. coal
B. plutonium
C. petroleum
D. uranium
E. solar energy

15. Which energy reserves in the Middle East are the largest in the world?

A. coal
B. plutonium
C. petroleum
D. uranium
E. solar energy

16. Which energy source are we likely to run out of first?

A. coal
B. plutonium
C. petroleum
D. uranium
E. solar energy

17. Which energy source can be converted into gasoline?

A. coal
B. plutonium
C. uranium
D. solar energy
E. none of these

18. Steam powered electric generating plants always produce a certain amount of

A. nuclear wastes
B. thermal pollution
C. sulfur gases
D. smoke particles

19. Which one of the pollutants listed below generally exists to a much lesser degree in the coal found in the western United States than the coal found in the eastern United States?

A. nitrogen
B. sulfur
C. carbon
D. fly ash

20. An automobile is most commonly associated with what type of pollution?

A. air pollution
B. water pollution
C. heat pollution
D. none of these

21. A solar collector is most commonly associated with what type of pollution?

    A. air pollution
    B. water pollution
    C. heat pollution
    D. none of these

22. A tanker is most commonly associated with what type of pollution?

    A. air pollution
    B. water pollution
    C. heat pollution
    D. none of these

23. This energy source produces large quantities of ash and sulfur pollution.

    A. fission
    B. coal
    C. petroleum
    D. solar energy
    E. fusion

24. Which of the following is <u>not</u> a potential problem with nuclear power plants?

    A. thermal pollution
    B. smoke pollution
    C. waste disposal
    D. radiation pollution

25. Nuclear power plants on lakes threaten marine life by

    A. raising the temperature of the water
    B. reducing the oxygen content of the water
    C. adding dangerous chemicals to the lake
    D. lowering the water level of the lake

26. Of which of the following fossil fuel sources does the United States have the largest reserves?

    A. natural gas
    B. crude oil
    C. coal
    D. tar sands

27. The United States has approximately 5% of the world's people. About what percent of the total amount of energy consumed on the earth in a year does the United States consume?

    A. 2%
    B. 5%
    C. 15%
    D. 30%

28. Approximately what percent of the oil consumed by the United States is imported from foreign countries?

A. 1 - 10%
B. 10 - 30%
C. 30 - 60%
D. 60 - 100%

29. A situation in which one or more nations prevent another nation from obtaining certain materials is

A. OPEC
B. GNP
C. embargo
D. NATO

30. A measure of the total output of services and products of a country is

A. OPEC
B. GNP
C. embargo
D. NATO

31. A group of countries which sells oil to other countries is

A. OPEC
B. GNP
C. embargo
D. NATO

32. In the United States, most electricity is produced in power plants owned by

A. the major oil companies
B. the federal government
C. utility corporations
D. cities and towns

33. The most serious environmental threat from a trans-Alaska oil pipeline is

A. its disturbing natural drainage pathways
B. the depletion of the still-developing oil reserves
C. its warming the climate, disturbing the ecological balance
D. the possibility of frost heaves' splitting it

34. Which practice adds most to land pollution?

A. allowing the ground in a forest to go unmaintained
B. introducing new varieties of wildlife in a meadow
C. collecting litter from open fields and depositing it in dumps
D. collecting litter from open fields and burning it

35. The most environmentally sound way to cut down traffic jams in and around major cities is to

A. build more and better-designed highways
B. improve the routing of traffic on existing highways
C. increase and improve public transportation facilities
D. have businesses stagger their working hours to make the amount of traffic more even throughout the day

36. What is the best way to prevent the washing away of topsoil?

A. building canals
B. planting grasses
C. having cattle graze the land
D. building stone fences at the edges of fields

37. The most serious environmental threat posed by off-shore oil drilling in the Gulf of Mexico is

A. damage to shrimp and oyster beds
B. salt water contaminating the oil
C. air pollution from off-shore fires
D. depleting the offshore oil reserves

38. Water drainage from coal mines is a significant source of water pollution in which area?

A. the Northwest United States
B. the Southwest United States
C. Alaska
D. the Appalachian area of the United States

39. The present day mining of hardrock minerals is specifically covered by the mining act of 1872. The act

A. provides for multiple use of the land
B. does not consider relative values such as scenery, wildlife, recreation and watershed
C. provides that scenery, wildlife, recreation and watershed must be considered, but that minerals come first
D. states that the miners must restore the land and replant some seed trees

40. Deep water ports in the United States are especially valuable to American oil companies because

A. they are particularly rich in underwater oil reserves
B. they enable loading and unloading of materials from tankers near the mainland
C. they enable the companies to control the importing of Middle East oil by charging high rates for use of these ports
D. all of these

41. Because more and more people want to "get back to nature," the national parks are becoming overcrowded and polluted. Some propose to ease this situation by creating more wilderness areas that visitors have to hike to. Which one of the following groups would most likely support that suggestion?

A. American Association of Lumber Companies
B. Sierra Club
C. National Loggers Union
D. American Four-Wheelers Association

42. In a dispute over how to use 500 acres of forest land in the Rocky Mountains, which of the following persons would probably not use an argument based on the economy and employment to support his or her position?

A. housing contractor
B. mining company president
C. Audubon Society spokesman
D. lumber company president

43. Which of the following plans have been considered for lessening the spread and damage of ocean-borne oil?

A. use of collecting agent causing oil slicks to contract upon themselves
B. use of a "slick-licker"--a tongue-like conveyor belt
C. a national contingency plan, involving many oil companies, to provide for fast integrated clean-up
D. none of the above
E. all of the above (A, B, and C)

44. A technique often used by environmentalists to block speculators from acquiring large tracts of land for building projects is called

A. the agri-grow technique
B. block busting
C. checker-boarding
D. gerrymandering

45. The efficiency with which wood products are utilized today is

A. significantly better than fifty years ago
B. about the same as fifty years ago
C. much poorer than fifty years ago

46. In the past, areas that coal companies strip mined have generally been

A. returned to their original appearance and use
B. developed into a more useful area than before the area was mined
C. left less attractive and useful than before strip mining
D. made into wildlife refuges

47. Strip mining one ton of coal in Wyoming or Montana usually disturbs _____ of the surface area than strip mining a ton of coal in West Virginia or Pennsylvania.

A. fewer square feet
B. about as many square feet
C. many more square feet

		True	False
48.	The trees in National Forests are more plentiful than the demand for them.	A	B
49.	National Forests lands are seldom considered for multiple use.	A	B
50.	Limiting the outward growth of a city usually forces concentrations of people and services, plus taller buildings.	A	B
51.	One of the causes of urban problems is the fact that as people earn more money they tend to move closer to their downtown jobs.	A	B
52.	Reserving one lane of traffic for vehicles with more than one person has proved to be an effective way of decreasing downtown traffic congestion.	A	B
53.	Setting aside wilderness areas in a state increases the real estate tax base in that state.	A	B

The purpose of "green belts" is to:

54.	limit indiscriminate growth.	A	B
55.	preserve a "piece of nature for all."	A	B
56.	preserve a place where future schools or universities would be built at great savings to tax payers.	A	B

The construction of dams and reservoirs:

57.	increases recreational facilities.	A	B
58.	increases water supplies for drinking and irrigation.	A	B
59.	preserves the ecological balance of the area.	A	B
60.	provides a stopping place for migrating waterfowl.	A	B

Industries which are proved in court to be polluting the environment:

61.	can be fined.	A	B
62.	usually have to pay for all the damage they have caused.	A	B
63.	can be ordered to stop polluting.	A	B
64.	are often allowed to continue polluting indefinitely.	A	B

APPENDIX A-2

Answer Key for Environmental Knowledge Survey

1.	D	33.	D
2.	B	34.	C
3.	C	35.	C
4.	B	36.	B
5.	A	37.	A
6.	A	38.	D
7.	D	39.	B
8.	C	40.	B
9.	B	41.	B
10.	A	42.	C
11.	A	43.	E
12.	B	44.	C
13.	D	45.	A
14.	E	46.	C
15.	C	47.	A
16.	C	48.	B
17.	A	49.	B
18.	B	50.	A
19.	B	51.	B
20.	A	52.	A
21.	D	53.	B
22.	B	54.	A
23.	B	55.	A
24.	B	56.	B
25.	A	57.	A
26.	C	58.	A
27.	D	59.	B
28.	C	60.	A
29.	C	61.	A
30.	B	62.	B
31.	A	63.	A
32.	C	64.	A

U.S.O.E. Grant No. G00-7602039

APPENDIX A-3

ENVIRONMENTAL ATTITUDE QUESTIONNAIRE

Social Science Education Consortium
855 Broadway
Boulder, Colorado 80302

January 1977

ENVIRONMENTAL QUESTIONNAIRE

Directions: Read each item and choose the response which best indicates how you feel about that issue or statement. Then blacken the appropriate space on your answer sheet.

		Strongly Agree	Agree	Disagree	Strongly Disagree
-	1. Environmental problems affect me almost every day.	A	B	C	D
+	2. At the current rate of consumption, this country probably has enough oil and natural gas to last more than 100 years.	A	B	C	D
+	3. Most energy problems could be solved within 15 years if we focused our efforts on developing solar energy and windpower.	A	B	C	D
-	4. The amount and quality of water in our lakes and streams may be greatly affected by our use of the land.	A	B	C	D
-	5. Generally, air pollution is getting worse every year.	A	B	C	D
-	6. Generally, water pollution is getting worse every year.	A	B	C	D
-	7. Generally, land pollution is getting worse every year.	A	B	C	D
-	8. Generally, the energy shortage is getting worse every year.	A	B	C	D
+	9. There is really no need to expand coal mining in the western U.S. during the next 15 years.	A	B	C	D
-	10. Energy shortages pose a serious threat to the future well-being of most Americans.	A	B	C	D
-	11. Environmental problems pose a serious threat to the future well-being of most Americans.	A	B	C	D
-	12. Unemployment poses a serious threat to the future well-being of most Americans.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
13.	In order to keep our economy going, it is necessary to continue mining minerals.	A	B	C	D
14.	Our economy could get along very well without cutting any more trees for lumber.	A	B	C	D
15.	I think the environmental problems associated with coal mines are extremely serious.	A	B	C	D
16.	I think the environmental problems associated with shipping in foreign oil are extremely serious.	A	B	C	D
17.	I think the environmental problems associated with coal powered generators are extremely serous.	A	B	C	D
18.	I think the environmental problems associated with nuclear powered generators are extremely serious.	A	B	C	D
19.	Coal is a necessary source of energy today.	A	B	C	D
20.	We don't need imported oil for today's energy needs.	A	B	C	D
21.	Most endangered species really aren't worth the money and trouble it would take to save them.	A	B	C	D
22.	The ultimate survival of the human race depends on how we manage our natural resources and environment.	A	B	C	D
23.	The protection of our natural environment should be the concern of everyone.	A	B	C	D
24.	Some wilderness areas should be preserved from man's technological utilization no matter what the cost.	A	B	C	D
25.	It is unfortunate that there are fewer and fewer areas in this country where man has never set foot.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
—	26. Even if other people don't work to improve the environment, it is important for me to do so.	A	B	C	D
+	27. Teenagers really aren't in a position to have any effect on environmental problems.	A	B	C	D
—	28. The average person can have considerable impact on environmental decision making in his community.	A	B	C	D
+	29. Most people can't have any influence on business and industrial actions which affect the environment.	A	B	C	D
+	30. Most people really can't have any influence on government policies which affect the environment.	A	B	C	D
—	31. If a group of high school students dicsovered that a local factory was polluting a stream, they could probably get public officials to investigate the situation.	A	B	C	D
+	32. We should continue to drill offshore oil wells even if some pollution of oceans and beaches results.	A	B	C	D
+	33. We need energy from coal so badly that we can't afford strong laws protecting the environment from strip mining.	A	B	C	D
+	34. The need for electricity is more important than the pollution problems caused in producing electricity.	A	B	C	D
—	35. We must greatly reduce the use of pesticides to ensure the health and safety of people, domestic animals, and wildlife, even though this will result in poorer crops.	A	B	C	D
—	36. Industry must be forced to protect our environment even if it means that things will cost more.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
—	37. Citizens should limit family size to cut down on the use of resources.	A	B	C	D
—	38. It is a good idea to preserve some forests, even if that means we will have less lumber to build houses, schools, etc.	A	B	C	D
+	39. Sufficient roads must be built to meet the demands made by more cars, even if this adds pollution to the environment.	A	B	C	D
—	40. If hikers and cross country skiers start destroying the environment, they should be kept out of wilderness areas.	A	B	C	D
—	41. Snowmobiles, jeeps and motorcycles should be banned in more natural areas than is now the case.	A	B	C	D
—	42. Considering the problems of pollution and crowding, we need to decrease the use of the automobile as a major means of transportation.	A	B	C	D
+	43. Because of our economic problems, it is more important to use natural resources now than to preserve them for the future.	A	B	C	D
+	44. I think this country should continue to build nuclear power plants even though there may be hazards associated with them.	A	B	C	D
—	45. It is more important to protect the environment against strip mining coal than to have the abundant energy that would come from coal which has been strip mined.	A	B	C	D
—	46. I think that more dams should be built to generate electricity, even if the water covers scenic valleys, farmlands, and wildlife areas.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
+	47. The United States should develop energy independence even if such efforts hurt our natural environment.	A	B	C	D
+	48. Strip mining of coal in the western states should begin as soon as possible as it will create more jobs and a much needed energy supply.	A	B	C	D
+	49. I would be in favor of a new industry moving into my community to ease unemployment problems.	A	B	C	D
—	50. The United States and other "have" nations are consuming more than their fair share of energy and resources.	A	B	C	D
—	51. I think the auto makers should be required to install pollution control devices on cars even if those cars use more gasoline.	A	B	C	D
—	52. I think that auto pollution control is more important than good gas mileage.	A	B	C	D
—	53. Plants and animals, of no apparent economic value to man, have a right to survive, regardless.	A	B	C	D
—	54. I think it is my responsibility to help save resources for my children and their children.	A	B	C	D
+	55. We should use all the natural gas, oil and gasoline we need now, because future generations will have new forms of energy which we don't have now.	A	B	C	D
+	56. Oil, gas and coal should be used now to keep the economy growing rather than saved or rationed.	A	B	C	D
—	57. On which of these should the most tax money be spent? A. cleaning up and protecting the environment B. developing energy resources				

90

+ 58. On which of these should the most tax money be spent?

A. creating jobs and lowering unemployment

B. cleaning up and protecting the environment

		Strongly Agree	Agree	Disagree	Strongly Disagree
−	59. We need stronger laws against pollution to protect our environment.	A	B	C	D
+	60. The national government spends too much money on pollution problems.	A	B	C	D
−	61. I like the idea of the government offering tax reductions to people who make their homes energy efficient (by weather stripping, adding insulation, etc.)	A	B	C	D
−	62. To save gasoline, a tax should be placed on cars which do not get good gas mileage.	A	B	C	D
−	63. The government should encourage people to heat their homes with solar energy by offering them a tax break.	A	B	C	D
−	64. Laws which force people to save energy should be passed.	A	B	C	D
−	65. The government should spend more money to pay people to install energy-saving devices in their homes (such as home insulation).	A	B	C	D
+	66. Education really can't influence people to protect the natural environment.	A	B	C	D
−	67. The government should spend money to educate the public in ways to conserve energy.	A	B	C	D
+	68. Teaching topics like environmental issues and conservation in school is a waste of time.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
–	69. If people would consume fewer goods and services, there would be less pollution.	A	B	C	D
–	70. If more people would live close to where they work, there would be less pollution.	A	B	C	D
–	71. One of the best solutions to environmental problems is for people to live simpler lives.	A	B	C	D
–	72. The government should spend more tax money to develop new energy sources.	A	B	C	D
–	73. The government should spend more tax money to improve the efficiency with which existing energy sources are used.	A	B	C	D
–	74. The government should spend more tax money to develop better ways for the public to conserve energy.	A	B	C	D
–	75. More scientific research should be done on environmental problems.	A	B	C	D
–	76. Citizens should join environmental organizations to protect the environment from misuse.	A	B	C	D
–	77. In order to be effective, citizens' groups working on environmental problems need more people to assume leadership roles.	A	B	C	D
+	78. I would vote against a law which requires a 5¢ deposit on all pop and beer containers.	A	B	C	D
+	79. I probably would not write a letter to my congressman asking him to vote for environmental protection measures.	A	B	C	D
–	80. I am willing to spend more to buy an item if the extra money will be used to limit pollution.	A	B	C	D
–	81. In order to help solve environmental problems, I would ride a bus or a bicycle more often, rather than driving a car.	A	B	C	D

	Strongly Agree	Agree	Disagree	Strongly Disagree
82. As long as I can afford it I will buy as big a car as I can.	A	B	C	D
83. As long as I can afford it I will buy as many throw away items as I want.	A	B	C	D
84. I don't care to hear anything more about environmental problems.	A	B	C	D
85. Individuals should leave land use decisions to community leaders since they are the closest to the problem.	A	B	C	D

86. If you had to go somewhere (to the drug store, the post office, etc.) which was one-half mile away, how would you usually go?

A. drive or ride in a car
B. walk
C. ride a bike
D. ride on a bus
E. other

87. How much time are you willing to spend in environmental clean-up projects?

A. none
B. one day per year
C. several days per year
D. one day a month
E. more than one day a month

88. When I have my own home, I plan to set the furnace thermostat at about _____.

A. 66^{o} F.
B. 68^{o} F.
C. 70^{o} F.
D. 72^{o} F.
E. 74^{o} F.

Suppose you were President of the United States. You are working on your budget for the next year and have $10 billion that you want to use in attempting to deal with some of our nation's most serious problems.

Show how you would allocate the money among the following options. You may put up to $4 billion on one problem. Otherwise, you may divide it in any way you wish.

For each problem indicate how many billion dollars you would spend on that problem by blackening the appropriate space on the answer sheet. Be sure the total of all six items equals $10 billion.

	Billions of Dollars					Problem
89.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to reduce unemployment and provide more jobs for Americans.
90.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to develop nuclear power plants so we will have more electricity in order to maintain or improve America's standard of living.
91.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to set aside more land to create wilderness areas.
92.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to subsidize the oil companies so that they may explore for new sources of domestic oil and thereby decrease our dependency on foreign oil.
93.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to clean up the pollution in the rivers in the United States.
94.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to decrease the crime rate in the cities of the United States.

A commission made up of persons from the states of Colorado, Nebraska, Wyoming and the federal government, has met to determine the electrical energy needs, for the next 50 years, of the midwest-mountain region.

For a variety of reasons too lengthy to explain here, the commission has made two recommendations. They are:

1. to build three more nuclear electrical power plants, one to be located in each state.
2. to build six more coal-fired electric plants, three in Nebraska, two in Wyoming, and one in Colorado. To fuel these plants the coal will be strip mined in Wyoming and sent by coal slurry to the plants. (Coal slurry is crushed coal mixed with water and pumped inside a large-diameter pipe.)

These recommendations are made because the demand for electrical energy will be greater than the supply in ten years. A popular vote of the citizens of the three states will decide if the recommendations are carried out. When the commission detailed its plans you discover that the route of the above-ground pipe line will go through your property. Furthermore, the strip mine area is one in which you and your family vacation each summer. If you and the rest of the citizens vote not to allow the plant and pipe line to be built, your standard of living will begin to decrease in 11 years.

Below are sets of words or phrases referring to the two recommendations. Each set is separated by five spaces. As you think about these recommendations, choose the space that best indicates your feelings. Then blacken the corresponding space on your answer sheet.

The Passing of the Two Proposals

95.	bad	A	B	C	D	E	good
96.	to be supported (for community good)	A	B	C	D	E	not to be supported (for community good)
97.	valuable for the region	A	B	C	D	E	not valuable for the region
98.	something I would be happy about (personally)	A	B	C	D	E	something I would be unhappy about (personally)
99.	something I need to know more about before I would decide how I feel	A	B	C	D	E	something I know enough about now to know how I feel
100.	I would vote for these proposals	A	B	C	D	E	I would vote against these proposals

			Strongly Agree	Agree	Disagree	Strongly Disagree
+	101.	Most of the time it doesn't pay to try hard because things never turn out right anyway.	A	B	C	D
+	102.	Most of the time I find it hard to change a friend's (mind) opinion.	A	B	C	D
+	103.	When I do something wrong there's usually very little I can do to make it right.	A	B	C	D
+	104.	One of the best ways to handle most problems is just not to think about them.	A	B	C	D
+	105.	When people are mean to me it is usually for no reason at all.	A	B	C	D
−	106.	Most of the time, I can change what might happen tomorrow by what I do today.	A	B	C	D
+	107.	When bad things are going to happen they just are going to happen no matter what I try to do to stop them.	A	B	C	D
+	108.	When somebody my age wants to be my enemy there's little I can do to change matters.	A	B	C	D
+	109.	When someone doesn't like me there's little I can do about it.	A	B	C	D
−	110.	I am the kind of person who believes that planning ahead makes things turn out better.	A	B	C	D
+	111.	If you don't watch yourself, people will take advantage of you.	A	B	C	D
+	112.	No one is going to care much what happens to you, when you get right down to it.	A	B	C	D
−	113.	Human nature is fundamentally cooperative.	A	B	C	D

114. Some people say that most people can be trusted. Others say you can't be too careful in your dealings with people. How do you feel about it?

A. most people can be trusted

B. you can't be too careful

115. Would you say that most people are more inclined to help others, or more inclined to look out for themselves?

A. to help others

B. to look out for themselves

U.S.O.E. Grant No. G00-7602039

APPENDIX A-4

ENVIRONMENTAL SURVEY

5

DO NOT OPEN UNTIL TOLD TO DO SO

Environmental Education Project
Social Science Education Consortium
855 Broadway
Boulder, Colorado 80302

ENVIRONMENTAL SURVEY

Directions

Read each item and choose the response which you believe provides the best answer to the question or the statement. Then blacken the appropriate space on the answer sheet.

1. In the United States, the greatest source of air pollution is

   A. industrial activities
   B. solid waste disposal
   C. burning of fuel to heat buildings
   D. motor vehicles

2. Over the past twenty years, the biggest source of pollutants in southern California smog has been the

   A. processing of crude oil at refineries
   B. burning of gasoline in automobile engines
   C. operation of jet airplanes
   D. burning of solid wastes

3. Which is the source of most of the world's oxygen?

   A. trees and other forest plants
   B. natural grasslands and farm pastures
   C. tiny plants near the surfaces of oceans
   D. plants, such as seaweed, growing at the bottoms of the oceans

4. Man adapts to a new environment

   A. by changing genetically
   B. by cultural adaptations
   C. by extrasensory perception
   D. by not changing

5. A plant is eaten by an insect which is then eaten by a trout. The trout is then eaten by a man. This is an example of

   A. a food chain
   B. natural selection
   C. mitosis
   D. osmosis

6. Which graph best shows the world's population since 1800?

1800 A. Present

1800 B. Present

1800 C. Present

1800 D. Present

7. Pollution was less a problem in rural areas of the United States 150 years ago than it is today, even on a per capita basis. This is mainly because

   A. agriculture was limited to the Eastern Seaboard
   B. people were more careful with their waste products
   C. much of the trash was burned and therefore not allowed to accumulate
   D. natural systems could absorb the waste of a smaller population

8. The most basic thing one can do to reduce the pollution from his or her automobile is to

   A. drive slowly
   B. change oil frequently
   C. keep his or her car "in tune"
   D. use high test gasoline

9. A senator who is concerned with the environment would most likely support a bill to

   A. develop large transport airplanes
   B. improve the efficiency of long-distance railroad transportation
   C. prohibit a long-distance truck to tow more than one trailer at a time
   D. add to the existing Interstate Highway System

10. To an environmentalist, which is the <u>least</u> desirable effect of the Interstate Highway System?

   A. good roads produce a desire for more privately-owned automobiles
   B. building the roads produces more jobs
   C. the roads permit easy travel from place to place
   D. using gasoline taxes to finance the construction discriminates against the individual motorist.

11. Which characteristic of DDT makes it environmentally dangerous?

   A. it lasts a long time in the air or on the ground
   B. it causes high death rates among farmers
   C. it rarely controls the pests for which it was intended
   D. it lowers the resistence of certain insects to other poisons

12. "Black lung" is a disease associated with

   A. cigarette smoking
   B. coal mining
   C. living in cities
   D. working in an oil refinery

13. What happens to the number of different varieties of fish in a stream as the pollution in the stream increases?

   A. it increases due to the addition of "trash fish"
   B. it remains the same, but with fewer fish of each variety
   C. it remains the same, but the varieties change
   D. it decreases

14. In the long run, which is the largest potential source of energy?

A. coal
B. plutonium
C. petroleum
D. uranium
E. solar energy

15. Which energy reserves in the Middle East are the largest in the world?

A. coal
B. plutonium
C. petroleum
D. uranium
E. solar energy

16. Which energy source are we likely to run out of first?

A. coal
B. plutonium
C. petroleum
D. uranium
E. solar energy

17. Which energy source can be converted into gasoline?

A. coal
B. plutonium
C. uranium
D. solar energy
E. none of these

18. Steam powered electric generating plants always produce a certain amount of

A. nuclear wastes
B. thermal pollution
C. sulfur gases
D. smoke particles

19. Which one of the pollutants listed below generally exists to a much lesser degree in the coal found in the western United States than the coal found in the eastern United States?

A. nitrogen
B. sulfur
C. carbon
D. fly ash

20. An automobile is most commonly associated with what type of pollution?

A. air pollution
B. water pollution
C. heat pollution
D. none of these

21. A solar collector is most commonly associated with what type of pollution?

    A. air pollution
    B. water pollution
    C. heat pollution
    D. none of these

22. A tanker is most commonly associated with what type of pollution?

    A. air pollution
    B. water pollution
    C. heat pollution
    D. none of these

23. This energy source produces large quantities of ash and sulfur pollution.

    A. fission
    B. coal
    C. petroleum
    D. solar energy
    E. fusion

24. Which of the following is <u>not</u> a potential problem with nuclear power plants?

    A. thermal pollution
    B. smoke pollution
    C. waste disposal
    D. radiation pollution

25. Nuclear power plants on lakes threaten marine life by

    A. raising the temperature of the water
    B. reducing the oxygen content of the water
    C. adding dangerous chemicals to the lake
    D. lowering the water level of the lake

26. Of which of the following fossil fuel sources does the United States have the largest reserves?

    A. natural gas
    B. crude oil
    C. coal
    D. tar sands

27. The United States has approximately 5% of the world's people. About what percent of the total amount of energy consumed on the earth in a year does the United States consume?

    A. 2%
    B. 5%
    C. 15%
    D. 30%

28. Approximately what percent of the oil consumed by the United States is imported from foreign countries?

A. 1 - 10%
B. 10 - 30%
C. 30 - 60%
D. 60 - 100%

29. A situation in which one or more nations prevent another nation from obtaining certain materials is

A. OPEC
B. GNP
C. embargo
D. NATO

30. A measure of the total output of services and products of a country is

A. OPEC
B. GNP
C. embargo
D. NATO

31. A group of countries which sells oil to other countries is

A. OPEC
B. GNP
C. embargo
D. NATO

32. In the United States, most electricity is produced in power plants owned by

A. the major oil companies
B. the federal government
C. utility corporations
D. cities and towns

33. The most serious environmental threat from a trans-Alaska oil pipeline is

A. its disturbing natural drainage pathways
B. the depletion of the still-developing oil reserves
C. its warming the climate, disturbing the ecological balance
D. the possibility of frost heaves' splitting it

34. Which practice adds most to land pollution?

A. allowing the ground in a forest to go unmaintained
B. introducing new varieties of wildlife in a meadow
C. collecting litter from open fields and depositing it in dumps
D. collecting litter from open fields and burning it

35. The most environmentally sound way to cut down traffic jams in and around major cities is to

A. build more and better-designed highways
B. improve the routing of traffic on existing highways
C. increase and improve public transportation facilities
D. have businesses stagger their working hours to make the amount of traffic more even throughout the day

36. What is the best way to prevent the washing away of topsoil?

A. building canals
B. planting grasses
C. having cattle graze the land
D. building stone fences at the edges of fields

37. The most serious environmental threat posed by off-shore oil drilling in the Gulf of Mexico is

A. damage to shrimp and oyster beds
B. salt water contaminating the oil
C. air pollution from off-shore fires
D. depleting the offshore oil reserves

38. Water drainage from coal mines is a significant source of water pollution in which area?

A. the Northwest United States
B. the Southwest United States
C. Alaska
D. the Appalachian area of the United States

39. The present day mining of hardrock minerals is specifically covered by the mining act of 1872. The act

A. provides for multiple use of the land
B. does not consider relative values such as scenery, wildlife, recreation and watershed
C. provides that scenery, wildlife, recreation and watershed must be considered, but that minerals come first
D. states that the miners must restore the land and replant some sced trees

40. Deep water ports in the United States are especially valuable to American oil companies because

A. they are particularly rich in underwater oil reserves
B. they enable loading and unloading of materials from tankers near the mainland
C. they enable the companies to control the importing of Middle East oil by charging high rates for use of these ports
D. all of these

41. Because more and more people want to "get back to nature," the national parks are becoming overcrowded and polluted. Some propose to ease this situation by creating more wilderness areas that visitors have to hike to. Which one of the following groups would most likely support that suggestion?

A. American Association of Lumber Companies
B. Sierra Club
C. National Loggers Union
D. American Four-Wheelers Association

42. In a dispute over how to use 500 acres of forest land in the Rocky Mountains, which of the following persons would probably not use an argument based on the economy and employment to support his or her position?

A. housing contractor
B. mining company president
C. Audubon Society spokesman
D. lumber company president

43. Which of the following plans have been considered for lessening the spread and damage of ocean-borne oil?

A. use of collecting agent causing oil slicks to contract upon themselves
B. use of a "slick-licker"--a tongue-like conveyor belt
C. a national contingency plan, involving many oil companies, to provide for fast integrated clean-up
D. none of the above
E. A, B, and C of the above

44. A technique often used by environmentalists to block speculators from acquiring large tracts of land for building projects is called

A. the agri-grow technique
B. block busting
C. checker-boarding
D. gerrymandering

45. The efficiency with which wood products are utilized today is

A. significantly better than fifty years ago
B. about the same as fifty years ago
C. much poorer than fifty years ago

46. In the past, areas that coal companies strip mined have generally been

A. returned to their original appearance and use
B. developed into a more useful area than before the area was mined
C. left less attractive and useful than before strip mining
D. made into wildlife refuges

47. Strip mining one ton of coal in Wyoming or Montana usually disturbs _____ of the surface area than strip mining a ton of coal in West Virginia or Pennsylvania.

A. fewer square feet
B. about as many square feet
C. many more square feet

		True	False
48.	The trees in National Forests are more plentiful than the demand for them.	A	B
49.	National Forests lands are seldom considered for multiple use.	A	B
50.	Limiting the outward growth of a city usually forces concentrations of people and services, plus taller buildings.	A	B
51.	One of the causes of urban problems is the fact that as people earn more money they tend to move closer to their downtown jobs.	A	B
52.	Reserving one lane of traffic for vehicles with more than one person has proved to be an effective way of decreasing downtown traffic congestion.	A	B
53.	Setting aside wilderness areas in a state increases the real estate tax base in that state.	A	B

The purpose of "green belts" is to:

54.	limit indiscriminate growth.	A	B
55.	preserve a "piece of nature for all."	A	B
56.	preserve a place where future schools or universities would be built at great savings to tax payers.	A	B

The construction of dams and reservoirs:

57.	increases recreational facilities.	A	B
58.	increases water supplies for drinking and irrigation.	A	B
59.	preserves the ecological balance of the area.	A	B
60.	provides a stopping place for migrating waterfowl.	A	B

Industries which are proved in court to be polluting the environment:

61.	can be fined.	A	B
62.	usually have to pay for all the damage they have caused.	A	B
63.	can be ordered to stop polluting.	A	B
64.	are often allowed to continue polluting indefinitely.	A	B

	Strongly Agree	Agree	Disagree	Strongly Disagree
65. We should continue to drill offshore oil wells even if some pollution of oceans and beaches results.	A	B	C	D
66. We need energy from coal so badly that we can't afford strong laws protecting the environment from strip mining.	A	B	C	D
67. The need for electricity is more important than the pollution problems caused in producing electricity.	A	B	C	D
68. We must greatly reduce the use of pesticides to ensure the health and safety of people, domestic animals, and wildlife, even though this will result in poorer crops.	A	B	C	D
69. Industry must be forced to protect our environment even if it means that things will cost more.	A	B	C	D
70. Citizens should limit family size to cut down on the use of resources.	A	B	C	D
71. It is a good idea to preserve some forests, even if that means we will have less lumber to build houses, schools, etc.	A	B	C	D
72. Sufficient roads must be built to meet the demands made by more cars, even if this adds pollution to the environment.	A	B	C	D
73. If hikers and cross country skiers start destroying the environment, they should be kept out of wilderness areas.	A	B	C	D
74. Snowmobiles, jeeps and motorcycles should be banned in more natural areas than is now the case.	A	B	C	D
75. Considering the problems of pollution and crowding, we need to decrease the use of the automobile as a major means of transportation.	A	B	C	D

	Strongly Agree	Agree	Disagree	Strongly Disagree
76. Because of our economic problems, it is more important to use natural resources now than to preserve them for the future.	A	B	C	D
77. I think this country should continue to build nuclear power plants even though there may be hazards associated with them.	A	B	C	D
78. It is more important to protect the environment against strip mining coal than to have the abundant energy that would come from coal which has been strip mined.	A	B	C	D
79. I think that more dams should be built to generate electricity, even if the water covers scenic valleys, farmlands, and wildlife areas.	A	B	C	D
80. The United States should develop energy independence even if such efforts hurt our natural environment.	A	B	C	D
81. Strip mining of coal in the western states should begin as soon as possible as it will create more jobs and a much needed energy supply.	A	B	C	D
82. I would be in favor of a new industry moving into my community to ease unemployment problems.	A	B	C	D
83. The United States and other "have" nations are consuming more than their fair share of energy and resources.	A	B	C	D
84. I think the auto makers should be required to install pollution control devices on cars even if those cars use more gasoline.	A	B	C	D
85. I think that auto pollution control is more important than good gas mileage.	A	B	C	D
86. Plants and animals, of no apparent economic value to man, have a right to survive, regardless.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
87.	I think it is my responsibility to help save resources for my children and their children.	A	B	C	D
88.	We should use all the natural gas, oil and gasoline we need now, because future generations will have new forms of energy which we don't have now.	A	B	C	D
89.	Oil, gas and coal should be used now to keep the economy growing rather than saved or rationed.	A	B	C	D

90. On which of these should the most tax money be spent?

A. cleaning up and protecting the environment

B. developing energy resources

91. On which of these should the most tax money be spent?

A. creating jobs and lowering unemployment

B. cleaning up and protecting the environment

		Strongly Agree	Agree	Disagree	Strongly Disagree
92.	Most of the time it doesn't pay to try hard because things never turn out right anyway.	A	B	C	D
93.	Most of the time I find it hard to change a friend's (mind) opinion.	A	B	C	D
94.	When I do something wrong there's usually very little I can do to make it right.	A	B	C	D
95.	One of the best ways to handle most problems is just not to think about them.	A	B	C	D
96.	When people are mean to me it is usually for no reason at all.	A	B	C	D
97.	Most of the time, I can change what might happen tomorrow by what I do today.	A	B	C	D
98.	When bad things are going to happen they just are going to happen no matter what I try to do to stop them.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
99.	When somebody my age wants to be my enemy there's little I can do to change matters.	A	B	C	D
100.	When someone doesn't like me there's little I can do about it.	A	B	C	D
101.	I am the kind of person who believes that planning ahead makes things turn out better.	A	B	C	D
102.	If you don't watch yourself, people will take advantage of you.	A	B	C	D
103.	No one is going to care much what happens to you, when you get right down to it.	A	B	C	D
104.	Human nature is fundamentally cooperative.	A	B	C	D

105. Some people say that most people can be trusted. Others say you can't be too careful in your dealings with people. How do you feel about it?

A. most people can be trusted

B. you can't be too careful

106. Would you say that most people are more inclined to help others, or more inclined to look out for themselves?

A. to help others

B. to look out for themselves

U.S.O.E. Grant No. G00-7602039

APPENDIX A-5

ENVIRONMENTAL QUESTIONNAIRE

#7

DO NOT OPEN UNTIL TOLD TO DO SO

Environmental Education Project
Social Science Education Consortium
855 Broadway
Boulder, Colorado 80302

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ENVIRONMENTAL QUESTIONNAIRE

Directions: Read each item and choose the response which best indicates how you feel about that issue or statement. Then blacken the appropriate space on your answer sheet.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. Environmental problems affect me almost every day.	A	B	C	D
2. At the current rate of consumption, this country probably has enough oil and natural gas to last more than 100 years.	A	B	C	D
3. Most energy problems could be solved within 15 years if we focused our efforts on developing solar energy and windpower.	A	B	C	D
4. The amount and quality of water in our lakes and streams may be greatly affected by our use of the land.	A	B	C	D
5. Generally, air pollution is getting worse every year.	A	B	C	D
6. Generally, water pollution is getting worse every year.	A	B	C	D
7. Generally, land pollution is getting worse every year.	A	B	C	D
8. Generally, the energy shortage is getting worse every year.	A	B	C	D
9. There is really no need to expand coal mining in the western U.S. during the next 15 years.	A	B	C	D
10. Energy shortages pose a serious threat to the future well-being of most Americans.	A	B	C	D
11. Environmental problems pose a serious threat to the future well-being of most Americans.	A	B	C	D
12. Unemployment poses a serious threat to the future well-being of most Americans.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
13.	In order to keep our economy going, it is necessary to continue mining minerals.	A	B	C	D
14.	Our economy could get along very well without cutting any more trees for lumber.	A	B	C	D
15.	I think the environmental problems associated with coal mines are extremely serious.	A	B	C	D
16.	I think the environmental problems associated with shipping in foreign oil are extremely serious.	A	B	C	D
17.	I think the environmental problems associated with coal powered generators are extremely serous.	A	B	C	D
18.	I think the environmental problems associated with nuclear powered generators are extremely serious.	A	B	C	D
19.	Coal is a necessary source of energy today.	A	B	C	D
20.	We don't need imported oil for today's energy needs.	A	B	C	D
21.	Most endangered species really aren't worth the money and trouble it would take to save them.	A	B	C	D
22.	The ultimate survival of the human race depends on how we manage our natural resources and environment.	A	B	C	D
23.	The protection of our natural environment should be the concern of everyone.	A	B	C	D
24.	Some wilderness areas should be preserved from man's technological utilization no matter what the cost.	A	B	C	D
25.	It is unfortunate that there are fewer and fewer areas in this country where man has never set foot.	A	B	C	D

	Strongly Agree	Agree	Disagree	Strongly Disagree
26. Even if other people don't work to improve the environment, it is important for me to do so.	A	B	C	D
27. Teenagers really aren't in a position to have any effect on environmental problems.	A	B	C	D
28. The average person can have considerable impact on environmental decision making in his community.	A	B	C	D
29. Most people can't have any influence on business and industrial actions which affect the environment.	A	B	C	D
30. Most people really can't have any influence on government policies which affect the environment.	A	B	C	D
31. If a group of high school students dicsovered that a local factory was polluting a stream, they could probably get public officials to investigate the situation.	A	B	C	D
32. We should continue to drill offshore oil wells even if some pollution of oceans and beaches results.	A	B	C	D
33. We need energy from coal so badly that we can't afford strong laws protecting the environment from strip mining.	A	B	C	D
34. The need for electricity is more important than the pollution problems caused in producing electricity.	A	B	C	D
35. We must greatly reduce the use of pesticides to ensure the health and safety of people, domestic animals, and wildlife, even though this will result in poorer crops.	A	B	C	D
36. Industry must be forced to protect our environment even if it means that things will cost more.	A	B	C	D

	Strongly Agree	Agree	Disagree	Strongly Disagree
37. Citizens should limit family size to cut down on the use of resources.	A	B	C	D
38. It is a good idea to preserve some forests, even if that means we will have less lumber to build houses, schools, etc.	A	B	C	D
39. Sufficient roads must be built to meet the demands made by more cars, even if this adds pollution to the environment.	A	B	C	D
40. If hikers and cross country skiers start destroying the environment, they should be kept out of wilderness areas.	A	B	C	D
41. Snowmobiles, jeeps and motorcycles should be banned in more natural areas than is now the case.	A	B	C	D
42. Considering the problems of pollution and crowding, we need to decrease the use of the automobile as a major means of transportation.	A	B	C	D
43. Because of our economic problems, it is more important to use natural resources now than to preserve them for the future.	A	B	C	D
44. I think this country should continue to build nuclear power plants even though there may be hazards associated with them.	A	B	C	D
45. It is more important to protect the environment against strip mining coal than to have the abundant energy that would come from coal which has been strip mined.	A	B	C	D
46. I think that more dams should be built to generate electricity, even if the water covers scenic valleys, farmlands, and wildlife areas.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
47.	The United States should develop energy independence even if such efforts hurt our natural environment.	A	B	C	D
48.	Strip mining of coal in the western states should begin as soon as possible as it will create more jobs and a much needed energy supply.	A	B	C	D
49.	I would be in favor of a new industry moving into my community to ease unemployment problems.	A	B	C	D
50.	The United States and other "have" nations are consuming more than their fair share of energy and resources.	A	B	C	D
51.	I think the auto makers should be required to install pollution control devices on cars even if those cars use more gasoline.	A	B	C	D
52.	I think that auto pollution control is more important than good gas mileage.	A	B	C	D
53.	Plants and animals, of no apparent economic value to man, have a right to survive, regardless.	A	B	C	D
54.	I think it is my responsibility to help save resources for my children and their children.	A	B	C	D
55.	We should use all the natural gas, oil and gasoline we need now, because future generations will have new forms of energy which we don't have now.	A	B	C	D
56.	Oil, gas and coal should be used now to keep the economy growing rather than saved or rationed.	A	B	C	D

57. On which of these should the most tax money be spent?

A. cleaning up and protecting the environment

B. developing energy resources

58. On which of these should the most tax money be spent?

A. creating jobs and lowering unemployment

B. cleaning up and protecting the environment

	Strongly Agree	Agree	Disagree	Strongly Disagree
59. We need stronger laws against pollution to protect our environment.	A	B	C	D
60. The national government spends too much money on pollution problems.	A	B	C	D
61. I like the idea of the government offering tax reductions to people who make their homes energy efficient (by weather stripping, adding insulation, etc.)	A	B	C	D
62. To save gasoline, a tax should be placed on cars which do not get good gas mileage.	A	B	C	D
63. The government should encourage people to heat their homes with solar energy by offering them a tax break.	A	B	C	D
64. Laws which force people to save energy should be passed.	A	B	C	D
65. The government should spend more money to pay people to install energy-saving devices in their homes (such as home insulation).	A	B	C	D
66. Education really can't influence people to protect the natural environment.	A	B	C	D
67. The government should spend money to educate the public in ways to conserve energy.	A	B	C	D
68. Teaching topics like environmental issues and conservation in school is a waste of time.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
69.	If people would consume fewer goods and services, there would be less pollution.	A	B	C	D
70.	If more people would live close to where they work, there would be less pollution.	A	B	C	D
71.	One of the best solutions to environmental problems is for people to live simpler lives.	A	B	C	D
72.	The government should spend more tax money to develop new energy sources.	A	B	C	D
73.	The government should spend more tax money to improve the efficiency with which existing energy sources are used.	A	B	C	D
74.	The government should spend more tax money to develop better ways for the public to conserve energy.	A	B	C	D
75.	More scientific research should be done on environmental problems.	A	B	C	D
76.	Citizens should join environmental organizations to protect the environment from misuse.	A	B	C	D
77.	In order to be effective, citizens' groups working on environmental problems need more people to assume leadership roles.	A	B	C	D
78.	I would vote against a law which requires a 5¢ deposit on all pop and beer containers.	A	B	C	D
79.	I probably would not write a letter to my congressman asking him to vote for environmental protection measures.	A	B	C	D
80.	I am willing to spend more to buy an item if the extra money will be used to limit pollution.	A	B	C	D
81.	In order to help solve environmental problems, I would ride a bus or a bicycle more often, rather than driving a car.	A	B	C	D

		Strongly Agree	Agree	Disagree	Strongly Disagree
82.	As long as I can afford it I will buy as big a car as I can.	A	B	C	D
83.	As long as I can afford it I will buy as many throw away items as I want.	A	B	C	D
84.	I don't care to hear anything more about environmental problems.	A	B	C	D
85.	Individuals should leave land use decisions to community leaders since they are the closest to the problem.	A	B	C	D

86. If you had to go somewhere (to the drug store, the post office, etc.) which was one-half mile away, how would you usually go?

A. drive or ride in a car
B. walk
C. ride a bike
D. ride on a bus
E. other

87. How much time are you willing to spend in environmental clean-up projects?

A. none
B. one day per year
C. several days per year
D. one day a month
E. more than one day a month

88. When I have my own home, I plan to set the furnace thermostat at about _____.

A. 66^{o} F.
B. 68^{o} F.
C. 70^{o} F.
D. 72^{o} F.
E. 74^{o} F.

Suppose you were President of the United States. You are working on your budget for the next year and have $10 billion that you want to use in attempting to deal with some of our nation's most serious problems.

Show how you would allocate the money among the following options. You may put up to $4 billion on one problem. Otherwise, you may divide it in any way you wish.

For each problem indicate how many billion dollars you would spend on that problem by blackening the appropriate space on the answer sheet. Be sure the total of all six items equals $10 billion.

	Billions of Dollars					Problem
89.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to reduce unemployment and provide more jobs for Americans
90.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to develop nuclear power plants so we will have more electricity in order to maintain or improve America's standard of living.
91.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to set aside more land to create wilderness areas.
92.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to subsidize the oil companies so that they may explore for new sources of domestic oil and thereby decrease our dependency on foreign oil.
93.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to clean up the pollution in the rivers in the United States.
94.	0 (A)	1 (B)	2 (C)	3 (D)	4 (E)	to decrease the crime rate in the cities of the United States.

A commission made up of persons from the states of Colorado, Nebraska, Wyoming and the federal government, has met to determine the electrical energy needs, for the next 50 years, of the midwest-mountain region.

For a variety of reasons too lengthy to explain here, the commission has made two recommendations. They are:

1. to build three more nuclear electrical power plants, one to be located in each state.
2. to build six more coal-fired electric plants, three in Nebraska, two in Wyoming, and one in Colorado. To fuel these plants the coal will be strip mined in Wyoming and sent by coal slurry to the plants. (Coal slurry is crushed coal mixed with water and pumped inside a large-diameter pipe.)

These recommendations are made because the demand for electrical energy will be greater than the supply in ten years. A popular vote of the citizens of the three states will decide if the recommendations are carried out. When the commission detailed its plans you discover that the route of the above-ground pipe line will go through your property. Furthermore, the strip mine area is one in which you and your family vacation each summer. If you and the rest of the citizens vote not to allow the plant and pipe line to be built, your standard of living will begin to decrease in 11 years.

Below are sets of words or phrases referring to the two recommendations. Each set is separated by five spaces. As you think about these recommendations, choose the space that best indicates your feelings. Then blacken the corresponding space on your answer sheet.

The Passing of the Two Proposals

95.	bad	A	B	C	D	E	good
96.	to be supported (for community good)	A	B	C	D	E	not to be supported (for community good)
97.	valuable for the region	A	B	C	D	E	not valuable for the region
98.	something I would be happy about (personally)	A	B	C	D	E	something I would be unhappy about (personally)
99.	something I need to know more about before I would decide how I feel	A	B	C	D	E	something I know enough about now to know how I feel
100.	I would vote <u>for</u> these proposals	A	B	C	D	E	I would vote <u>against</u> these proposals

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		Strongly Agree	Agree	Disagree	Strongly Disagree
101.	Most of the time it doesn't pay to try hard because things never turn out right anyway.	A	B	C	D
102.	Most of the time I find it hard to change a friend's (mind) opinion.	A	B	C	D
103.	When I do something wrong there's usually very little I can do to make it right.	A	B	C	D
104.	One of the best ways to handle most problems is just not to think about them.	A	B	C	D
105.	When people are mean to me it is usually for no reason at all.	A	B	C	D
106.	Most of the time, I can change what might happen tomorrow by what I do today.	A	B	C	D
107.	When bad things are going to happen they just are going to happen no matter what I try to do to stop them.	A	B	C	D
108.	When somebody my age wants to be my enemy there's little I can do to change matters.	A	B	C	D
109.	When someone doesn't like me there's little I can do about it.	A	B	C	D
110.	I am the kind of person who believes that planning ahead makes things turn out better.	A	B	C	D
111.	If you don't watch yourself, people will take advantage of you.	A	B	C	D
112.	No one is going to care much what happens to you, when you get right down to it.	A	B	C	D
113.	Human nature is fundamentally cooperative.	A	B	C	D

114. Some people say that most people can be trusted. Others say you can't be too careful in your dealings with people. How do you feel about it?

A. most people can be trusted
B. you can't be too careful

115. Would you say that most people are more inclined to help others, or more inclined to look out for themselves?

A. to help others
B. to look out for themselves

116. In the United States, the greatest source of air pollution is

A. industrial activities
B. solid waste disposal
C. burning of fuel to heat buildings
D. motor vehicles

117. A plant is eaten by an insect which is then eaten by a trout. The trout is then eaten by a man. This is an example of

A. a food chain
B. natural selection
C. mitosis
D. osmosis

118. Which characteristic of DDT makes it environmentally dangerous?

A. it lasts a long time in the air or on the ground
B. it causes high death rates among farmers
C. it rarely controls the pests for which it was intended
D. it lowers the resistence of certain insects to other poisons

119. "Black lung" is a disease associated with

A. cigarette smoking
B. coal mining
C. living in cities
D. working in an oil refinery

120. Which energy reserves in the Middle East are the largest in the world?

A. coal
B. plutonium
C. petroleum
D. uranium
E. solar energy

121. Which energy source are we likely to run out of first?

A. coal
B. plutonium
C. petroleum
D. uranium
E. solar energy

122. The United States has approximately 5% of the world's people. About what percent of the total amount of energy consumed on the earth in a year does the United States consume?

A. 2%
B. 5%
C. 15%
D. 30%

123. A situation in which one or more nations prevent another nation from obtaining certain materials is

A. OPEC
B. GNP
C. embargo
D. NATO

124. A group of countries which sells oil to other countries is

A. OPEC
B. GNP
C. embargo
D. NATO

125. In the United States, most electricity is produced in power plants owned by

A. the major oil companies
B. the federal government
C. utility corporations
D. cities and towns

126. The most serious environmental threat posed by off-shore drilling in the Gulf of Mexico is

A. damage to shrimp and oyster beds
B. salt water contaminating the oil
C. air pollution from off-shore fires
D. depleting the off-shore oil reserves

127. The present day mining of hardrock minerals is specifically covered by the mining act of 1872. The act

A. provides for multiple use of the land
B. does not consider relative values such as scenery, wildlife, recreation and watershed
C. provides that scenery, wildlife, recreation and watershed must be considered, but that minerals come first
D. states that the miners must restore the land and replant some seed trees

128. Because more and more people want to "get back to nature," the national parks are becoming overcrowded and polluted. Some propose to ease this situation by creating more wilderness areas that visitors have to hike to. Which one of the following groups would most likely support that suggestion?

A. American Association of Lumber Companies
B. Sierra Club
C. National Loggers Union
D. American Four-Wheelers Association

	True	False
129. National Forests lands are seldom considered for multiple use.	A	B

The purpose of "green belts" is to:

130. limit indiscriminate growth.	A	B
131. preserve a "piece of nature for all."	A	B
132. preserve a place where future schools or universities would be built at great savings to tax payers.	A	B

The construction of dams and reservoirs:

133. increases recreational facilities.	A	B
134. increases water supplies for drinking and irrigation.	A	B

Industries which are proved in court to be polluting the environment:

135. can be fined.	A	B
136. usually have to pay for all the damage they have caused.	A	B
137. are often allowed to continue polluting indefinitely.	A	B

APPENDIX A-6

TEACHER CURRICULUM EVALUATION FORM

Title of the book_____

Author(s)_____

Teacher's name_____

School and district_____

Grade level of students that text was used with_____

Sections of the text actually taught_____

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. The readings are clearly written and appropriate for this grade level.	____	____	____	____	____
2. The questions and activities stimulated student thinking and learning.	____	____	____	____	____
3. The major concepts are well developed.	____	____	____	____	____
4. Ample teaching suggestions are provided either in the student text or teaching guide.	____	____	____	____	____
5. Sufficient guidelines or procedures to evaluate student progress are included.	____	____	____	____	____
6. The text stimulated and/or maintained the interest of my students in environmental issues.	____	____	____	____	____
7. This text helped my students learn important environmental concepts.	____	____	____	____	____

8. What did you especially like about this text?

9. What did you especially dislike about this text?

10. What recommendations for revision or suggestions would you make for teachers using this text?

APPENDIX A-7

MATERIALS PREFERENCE FORM

1. From the materials supplied to you for the Environmental Education Project, identify and rank the two best articles. Briefly describe what conditions, materials, etc. made them so good.

   A.

   B.

2. From the same materials identify the one article that you wouldn't use again. Why?

   _____.

APPENDIX A-8

STUDENT CURRICULUM EVALUATION FORM

Title of the book_____

Author(s)_____

Your teacher_____

Your school_____

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. This book was interesting and enjoyable to read.	____	____	____	____	____
2. This book helped me to learn some new things about today's environmental problems.	____	____	____	____	____
3. I participated in many of the suggested activities.	____	____	____	____	____
4. This book was very difficult to read and understand.	____	____	____	____	____
5. I would recommend this book to other students taking environmental education.	____	____	____	____	____

6. What did you like most about this environmental education book?

7. What did you dislike most about this environmental education book?

8. What suggestions would you make to teachers and students using this book?

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SSEC
Social Science Education Consortium, Inc.
Educational Resources Center • (303) 492-8154 • 855 Broadway • Boulder, Colorado 80302

SSEC ENVIRONMENTAL EDUCATION PROJECT, 1976-77: AN OVERVIEW

Recently, the Social Science Education Consortium has been funded by the U.S. Office of Education to evaluate selected student resources for environmental education. The heart of this project involves a number of secondary social studies and science teachers in Colorado using one of these resources with one of their classes. We would like one or more teachers from your school to be a part of this project. We believe the experience will be mutually beneficial to your school and SSEC. In order for you to consider participating, the basic procedures involved in the project are explained below.

If your school decides to become involved in the project, we will supply each participating teacher with a classroom set of one environmental education mini-text and the accompanying teacher's guide. The teachers will then use sections of the book and any other activities which they have previously used or developed as the basis for a six-week unit of instruction in one of their classes. This six-week period will be sometime between January 3 - March 30, 1977. Prior to that all teachers will participate in a planning session in Boulder one Saturday in November or December. A followup session will also be held in May or June. Each teacher will be paid $30 for each of those sessions plus travel expenses and will be allowed to keep the texts. In addition, SSEC will pay an honorarium of $200 for each participating teacher. Depending upon school policy, this honorarium may go to the individual teacher or to the school.

In order to find out what effects the books have had on students' learning, we will administer a pretest and posttest on environmental knowledge and attitudes to the class receiving the six-week instruction and to one of the teacher's other classes. In addition, we will ask the participating teachers and students to give us their opinions about the book they have used.

We think this project will provide some very useful information about environmental education materials. We hope you will agree to work with us in this project. If you have any questions please call Doug Superka or Bob Barrett collect at (303) 492-8155.

IRVING MORRISSETT, EXECUTIVE DIRECTOR • JAMES E. DAVIS, ASSOCIATE DIRECTOR

APPENDIX B-2

ENVIRONMENTAL EDUCATION - VALUES

PARTICIPATING TEACHERS

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776-6014

Ms. Linda Hart
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1040 Sunset
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776-6014

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Key: O definitely use these sections
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L primarily a "land use" topic
E primarily an "energy" topic
L+E land use and energy topic

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Key: ① definitely use these sections
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APPENDIX B-4

NAME_____ SCHOOL_____

COURSE TITLE_____ BOOK USED_____

FOR WEEK OF_____

This form is to be used by you to keep an accurate record of weekly activities. We are not looking for lesson plans which state behavioral objectives or other student outcomes, rather we want you to list general class activities such as student assignment in or out of class, specific pages or chapters assigned, title of films or filmstrips, etc.

Our plan is to have you put each sheet in the mail by the following Monday so that we may keep our evaluation process current. Thanks for taking the few extra moments to do this.

	MONDAY	*APT	TUESDAY	APT	WEDNESDAY	APT	THURSDAY	APT	FRIDAY	APT
In class activities										
	MONDAY	*ANM	TUESDAY	ANM	WEDNESDAY	ANM	THURSDAY	ANM	FRIDAY	ANM
Out of class activities										

* The abreviations APT and ANM stand for "Approximate Percentage of Time" and "Approximate Number of Minutes."

Weekend Out of Class Activities

SATURDAY	ANM	SUNDAY	ANM

Do you know if students in your control class have been exposed to environmental issues or environmental related activities during the week? (no) (yes). If yes, explain in the space below.

APPENDIX B-5

Teacher Debriefing Meeting

A debriefing meeting for the participating teachers was held at SSEC on Saturday, May 14, 1977 from 9:00 a.m. to 4:00 p.m. The two major purposes of the meeting were to present and discuss the results of the study (as we had them at that time) and have the teachers share their activities and experiences. Two other purposes were to obtain feedback from the teachers on how well we conducted the project and to present the teachers with other materials and resources which they could use to teach energy/environment issues.

Nine of the 16 teachers attended the meeting. Five of these teachers had used Spaceship Earth, four The Environmental Crisis and The Energy Crisis. Five were social studies teachers and four were science teachers.

The first part of the meeting involved a presentation and discussion of the student and teacher evaluations of the texts used in the study. Then, in small groups, the teachers discussed the various ways they used the books in their classes. Some of the items considered were: "Which in-class process for discussion of the issues worked best for you - small group or entire class? Why?" "Specify the extent to which you used the activities and exercises at the end of each chapter." This kind of information, which was reported to the whole teacher group during the meeting, helped us to describe the nature of the two treatments. The teachers also generated a list of the other specific resources they used during the six-week unit. This was useful to SSEC in describing the actual treatment and to the teachers for their future classroom use.

The second part of the meeting focused on presenting and discussing the research results related to gains in student knowledge of environment/energy issues and changes in students' attitudes toward the environment. Since further analyses were to be run and more examination of existing data was to occur, the results were presented as tentative and preliminary findings.

The final aspect of the meeting was designed to provide teachers with concrete ideas for their classes next year. Five of the teachers distributed copies of activities that they used successfully during the unit of instruction. Each teacher briefly explained how to use his or her activity. A member of our staff then showed the teachers some new energy/environment curriculum materials

which SSEC had in their Resource and Demonstration Center. At this point the teachers were free to examine those and other resources in the library.

The written evaluations of the debriefing session indicated that the teachers felt that the meet was very worthwhile. The staff also concluded that the meeting was a very useful activity to include in this research project.

SSEC ENVIRONMENTAL EDUCATION PROJECT

Testing Procedure

Tasks Before the Testing Session

1. Collect the following materials in appropriate quantities:
   a. sharpened #2 pencils
   b. standard answer sheets (160 item)
   c. copies of the "Environmental Survey"
   d. copies of the "Environmental Questionnaire"
   e. classroom copies of the text or tests your teacher will be using with his/her experimental class (Spaceship Earth or Environmental and Energy Crisis)
   f. the code number for your teacher (#1-16)
   g. answer sheet transparency and grease pencil
2. Give the teacher the classroom sets of books and have him/her sign the receipt form.
3. Obtain class lists (for experimental and control groups). You will use this to record which test each student is taking.
4. Tell the teacher that he or she can help with administrativia and then leave while students take the tests. Also tell them: "Because the students will be posttested, you (teacher) should indicate to your students that you do not want them to discuss the pretest with you." Discussion of the tests can occur after the project is over and copies of the tests are available for review with students.
5. Fill out the transparency with the appropriate information for the group you are testing. If doing several groups in one day have the information written down so you can easily change the numbers and words to fit each class.

Testing Instructions

1. STATE: I'm _____ and I work for the Social Science Education Consortium in Boulder. We are conducting an important research study on high school students' knowledge of and feelings about environmental issues and books which teach about environmental issues. You are one of 16 classes in Colorado helping us on this project. Results will be published in several national journals later on in the year.

   Today we'd like you to help by filling out a questionnaire or survey form. You can help mainly by answering each question or item as honestly as possible and as best you can. No one in your school will ever know your responses. They are for our purposes only. Now we need to hand out the materials. Please do not open the survey forms until told to dc so.

2. DISTRIBUTE A #2 PENCIL AND ANSWER SHEET TO EACH STUDENT. DISTRIBUTE THE FORMS. HALF THE STUDENTS WILL GET THE "SURVEY" (COGNITIVE) AND HALF THE "QUESTIONNAIRE" (AFFECTIVE). WITH YOU HANDING OUT THE #5 SURVEY AND THE TEACHER THE #7 QUESTIONNAIRE, GIVE ONE TO EVERY OTHER STUDENT.

3. STATE: All your responses to the questionnaire will be placed on this answer sheet.

   A #2 pencil must be used to fill it out! Is there anyone who doesn't have a #2 pencil and answer sheet?

4. NOW TURN ON THE TRANSPARENCY. SHOW THEM WHERE AND WHAT TO FILL OUT. (Demonstrate: [ ])
   a. Beside "instructor" print your teacher's last name (State it, e.g. Campbell)
   b. Then beside "Dept." print "science" or "social studies" (Depending on the teacher)
   c. Then beside "course" put the class period number which is _____. (State that number)

5. STATE: Now on the top right hand side of the answer sheet print your full name, last name first, then your first name, as I did and blacken in the correct spaces below as I did. Do not use the box below "MI."

   If either of your names has more letters than boxes stop when you run out of boxes.

6. STATE: Now look at the "MI" box next to your name. In the box under "MI", if you are female print an "F"; if you are a male print an "M."

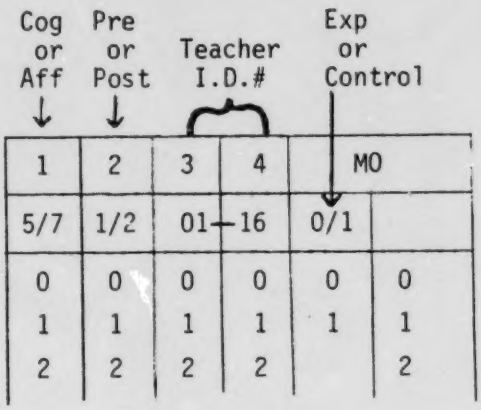
   Blacken the F or M in the space below as you did with your name.

7. STATE: Now look in the lower right hand corner of the answer sheet. DRAW THEIR ATTENTION TO IT BY POINTING TO THE SECTION ON THE TRANSPARENCY.

1	2	3	4

1	2	3	4
5/7	1	---	---
0 1 2	0 1 2	0 1 2	0 1 2

8. STATE: Write the same numbers in the boxes that I have written here except use only a 5 or 7 according to the number on your form. Also blacken the appropriate spaces below the numbers as you did before.
NOTE TO ADMINISTRATOR: The information provided in the above directions is the following:



Cog = 5 Pre = 1 Teacher = see Control = 0
Aff = 7 Post = 2 separate sheet Experimental = 1

9. SUMMARIZE BY SAYING: Now the numbers in that section should be:
either __5__ or __7__ followed by _____ _____ _____ _____.

10. STATE: Now turn your answer sheet lengthwise (DEMONSTRATE WITH TRANSPARENCY: ☐)

I have just a few more instructions about using the answer sheet with the questionnaire or survey.

a. Notice that as you complete your survey or questionnaire you will be working <u>across</u> the answer sheet, not down.

b. To answer each item make a black mark in the space on the answer sheet.
DEMONSTRATE WITH ITEM ON TRANSPARENCY: 5 T [A] F [B] [C] [D] [E]
As you can see, if you have any true/false items to answer use only the A and B responses for those items.

c. Completely erase all changes. Don't put an "X" through the space to change your answer.

d. Don't make any stray marks on the answer sheet.

e. Please don't crease or bend it.

11. CONCLUDE BY STATING: We would like you to answer every item on the form as best you can, even if you don't completely understand each item. I cannot answer any questions about the meaning of words or items. You should have plenty of time to finish the questionnaire or survey.

    Thanks for plowing through these directions!

    Does anyone have any questions?

ANSWER ONLY PROCEDURAL QUESTIONS. TO OTHER QUESTIONS SAY: I can't answer that question!

    O.K. Let's begin.

Appendix B-7

Schedule of Activities Completed During the Project

The schedule below indicates the dates when the various activities of the project were completed.

1) Making Final Plans and Preparation

   a) Final review of proposed study design (October 11, 1976).

   b) Selection of participating teachers and schools (October 30, 1976) and clarification of financial arrangements.

   c) Planning sessions with teachers (December 11 and 20, 1976).

   d) Examination and selection, construction, and testing of data gathering instruments (December 30, 1976).

   e) Collection and preparation of materials for teaching the units and for testing (December 30, 1976).

2) Implementing the Design

   a) Administration of pretests to experimental and control classes (February 4, 1977).

   b) Teaching the environmental education units (January 24 - April 18, 1977). Sometime within this 12-week period all 16 teachers completed the six-week units.

   c) Administration of posttests and curriculum evaluation forms (April 18, 1977).

3) Determining the Results

   a) Data processing (April 29, 1977).

   b) Analysis and interpretation of data (June 10, 1977).

   c) Sharing and debriefing session with participating teachers (May 14, 1977).

4) Summarizing and Reporting the Results

   a) Review of preliminary results by social science and environmental education educators (June 11, 1977).

   b) Writing preliminary report (June 30, 1977).

   c) Writing and editing final report (August 31, 1977).

   d) Final editing of teacher and student evaluation summaries (August 31, 1977).

   e) Writing and editing article for professional journal (to be completed by September 30, 1977).

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APPENDIX C-1

Four-Way ANOVAS - F Scores and Error Terms

APPENDIX C-1

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - GENERAL KNOWLEDGE

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	7.9418	8.897871E+00	1	8.897871E+00	32.000(1)	2.000(16)
2	V	T(VAS)	.0439	4.914112E-02	1	4.914112E-02	16.000(2)	2.000(16)
3	A	T(VAS)	.0130	1.453513E-02	1	1.453513E-02	16.000(3)	2.000(16)
4	S	T(VAS)	.1118	1.252501E-01	1	1.252501E-01	16.000(4)	2.000(16)
5	X	TX(VAS)	8.3172	3.337236E+00	1	3.337236E+00	16.000(5)	1.000(18)
6	VA	T(VAS)	.3732	4.181551E-01	1	4.181551E-01	8.000(6)	2.000(16)
7	VS	T(VAS)	.8431	9.446251E-01	1	9.446251E-01	8.000(7)	2.000(16)
8	AS	T(VAS)	.4693	5.258251E-01	1	5.258251E-01	8.000(8)	2.000(16)
9	VX	TX(VAS)	.0193	7.750125E-03	1	7.750125E-03	8.000(9)	1.000(18)
10	AX	TX(VAS)	.2620	1.051111E-01	1	1.051111E-01	8.000(10)	1.000(18)
11	SX	TX(VAS)	.6487	2.602811E-01	1	2.602811E-01	8.000(11)	1.000(18)
12	VAS	T(VAS)	.1837	2.057611E-01	1	2.057611E-01	4.000(12)	2.000(16)
13	VAX	TX(VAS)	.0147	5.886125E-03	1	5.886125E-03	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.1403	5.628012E-02	1	5.628012E-02	4.000(14)	1.000(18)
15	ASX	TX(VAS)	.0107	4.278125E-03	1	4.278125E-03	4.000(15)	1.000(18)
16	T(VAS)			8.963849E+00	8	1.120481E+00	2.000(16)	
17	VASX	TX(VAS)	2.3405	9.391351E-01	1	9.391351E-01	2.000(17)	1.000(18)
18	TX(VAS)			3.209967E+00	8	4.012459E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - ENERGY KNOWLEDGE

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	22.3420	1.444263E+01	1	1.444263E+01	32.000(1)	2.000(16)
2	V	T(VAS)	1.7847	1.153680E+00	1	1.153680E+00	16.000(2)	2.000(16)
3	A	T(VAS)	.0124	8.001125E-03	1	8.001125E-03	16.000(3)	2.000(16)
4	S	T(VAS)	.4852	3.136320E-01	1	3.136320E-01	16.000(4)	2.000(16)
5	X	TX(VAS)	6.3620	7.309576E+00	1	7.309576E+00	16.000(5)	1.000(18)
6	VA	T(VAS)	3.6020	2.328482E+00	1	2.328482E+00	8.000(6)	2.000(16)
7	VS	T(VAS)	.0809	5.232613E-02	1	5.232613E-02	8.000(7)	2.000(16)
8	AS	T(VAS)	.3080	1.990805E-01	1	1.990805E-01	8.000(8)	2.000(16)
9	VX	TX(VAS)	.3256	3.741125E-01	1	3.741125E-01	8.000(9)	1.000(18)
10	AX	TX(VAS)	.2584	2.968351E-01	1	2.968351E-01	8.000(10)	1.000(18)
11	SX	TX(VAS)	.6942	7.975845E-01	1	7.975845E-01	8.000(11)	1.000(18)
12	VAS	T(VAS)	.0000	1.512500E-05	1	1.512500E-05	4.000(12)	2.000(16)
13	VAX	TX(VAS)	.8204	9.425645E-01	1	9.425645E-01	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.0062	7.140125E-03	1	7.140125E-03	4.000(14)	1.000(18)
15	ASX	TX(VAS)	.5866	6.762845E-01	1	6.762845E-01	4.000(15)	1.000(18)
16	T(VAS)			5.171473E+00	8	5.464342E-01	2.000(16)	
17	VASX	TX(VAS)	.0258	2.964613E-02	1	2.964613E-02	2.000(17)	1.000(18)
18	TX(VAS)			9.191600E+00	8	1.148950E+00	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - LAND USE KNOWLEDGE

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	13.8784	1.486352E+01	1	1.486352E+01	32.000(1)	2.000(16)
2	V	T(VAS)	.1099	1.177338E-01	1	1.177338E-01	16.000(2)	2.000(16)
3	A	T(VAS)	.3585	3.839070E-01	1	3.839070E-01	16.000(3)	2.000(16)
4	S	T(VAS)	3.136[illegible]	3.358584E+00	1	3.358584E+00	16.000(4)	2.000(16)
5	X	TX(VAS)	5.9472	4.576069E+00	1	4.576069E+00	16.000(5)	1.000[illegible]
6	VA	T(VAS)	.0171	1.828828E-02	1	1.828828E-02	8.000(6)	2.000(16)
7	VS	T(VAS)	.8193	8.774813E-01	1	8.774813E-01	8.000(7)	2.000(16)
8	AS	T(VAS)	2.2468	2.406270E+00	1	2.406270E+00	8.000(8)	2.000(16)
9	VX	TX(VAS)	.3966	3.051758E-01	1	3.051758E-01	8.000(9)	1.000(18)
10	AX	TX(VAS)	.5733	4.410953E-01	1	4.410953E-01	8.000(10)	1.000(18)
11	SX	TX(VAS)	.3413	2.626313E-01	1	2.626313E-01	8.000(11)	1.000(18)
12	VAS	T(VAS)	.4101	4.392188E-01	1	4.392188E-01	4.000(12)	2.000(16)
13	VAX	TX(VAS)	1.2614	9.705728E-01	1	9.705728E-01	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.6155	4.736078E-01	1	4.736078E-01	4.000(14)	1.000(18)
15	ASX	TX(VAS)	3.3877	2.606615E+00	1	2.606615E+00	4.000(15)	1.000(18)
16	T(VAS)			8.567874E+00	8	1.070984E+00	2.000(16)	
17	VASX	TX(VAS)	.0342	2.627778E-02	1	2.627778E-02	2.000(17)	1.000(18)
18	TX(VAS)			6.155555E+00	8	7.694443E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - TOTAL COGNITIVE KNOWLEDGE

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	32.2820	1.131835E+02	1	1.131835E+02	32.000(1)	2.000(16)
2	V	T(VAS)	.2586	9.065311E-01	1	9.065311E-01	16.000(2)	2.000(16)
3	A	T(VAS)	.1208	4.236601E-01	1	4.236601E-01	16.000(3)	2.000(16)
4	S	T(VAS)	.7557	2.649602E+00	1	2.649602E+00	16.000(4)	2.000(16)
5	X	TX(VAS)	19.6221	4.448131E+01	1	4.448131E+01	16.000(5)	1.000(18)
6	VA	T(VAS)	1.5179	5.321953E+00	1	5.321953E+00	8.000(6)	2.000(16)
7	VS	T(VAS)	1.3032	4.569264E+00	1	4.569264E+00	8.000(7)	2.000(16)
8	AS	T(VAS)	.9552	3.348872E+00	1	3.348872E+00	8.000(8)	2.000(16)
9	VX	TX(VAS)	.5109	1.158242E+00	1	1.158242E+00	8.000(9)	1.000(18)
10	AX	TX(VAS)	.0873	1.978205E-01	1	1.978205E-01	8.000(10)	1.000(18)
11	SX	TX(VAS)	.3504	7.944301E-01	1	7.944301E-01	8.000(11)	1.000(18)
12	VAS	T(VAS)	.0129	4.530050E-02	1	4.530050E-02	4.000(12)	2.000(16)
13	VAX	TX(VAS)	.0037	8.320500E-03	1	8.320500E-03	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.3121	7.074551E-01	1	7.074551E-01	4.000(14)	1.000(18)
15	ASX	TX(VAS)	2.4790	5.619628E+00	1	5.619628E+00	4.000(15)	1.000(18)
16	T(VAS)			2.804872E+01	8	3.506090E+00	2.000(16)	
17	VASX	TX(VAS)	.4228	9.584201E-01	1	9.584201E-01	2.000(17)	1.000(18)
18	TX(VAS)			1.813523E+01	8	2.266904E+00	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - SERIOUSNESS OF ENVIRONMENTAL PROBLEM

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	.0134	5.104012E-02	1	5.104012E-02	32.000(1)	2.000(16)
2	V	T(VAS)	.5791	2.213408E+00	1	2.213408E+00	16.000(2)	2.000(16)
3	A	T(VAS)	.1006	3.845645E-01	1	3.845645E-01	16.000(3)	2.000(16)
4	S	T(VAS)	1.0953	4.186171E+00	1	4.186171E+00	16.000(4)	2.000(16)
5	X	TX(VAS)	.9229	2.789522E+00	1	2.789522E+00	16.000(5)	1.000(18)
6	VA	T(VAS)	2.9385	1.123143E+01	1	1.123143E+01	8.000(6)	2.000(16)
7	VS	T(VAS)	.2367	9.045125E-01	1	9.045125E-01	8.000(7)	2.000(16)
8	AS	T(VAS)	.0147	5.611250E-02	1	5.611250E-02	8.000(8)	2.000(16)
9	VX	TX(VAS)	2.6085	6.070670E+00	1	6.070670E+00	8.000(9)	1.000(18)
10	AX	TX(VAS)	.0944	2.853901E-01	1	2.853901E-01	8.000(10)	1.000(18)
11	SX	TX(VAS)	.1425	4.305920E-01	1	4.305920E-01	8.000(11)	1.000(18)
12	VAS	T(VAS)	.5543	2.114596E+00	1	2.114596E+00	4.000(12)	2.000(16)
13	VAX	TX(VAS)	.0071	2.142450E-02	1	2.142450E-02	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.0247	7.469112E-02	1	7.469112E-02	4.000(14)	1.000(18)
15	ASX	TX(VAS)	.7762	2.333880E+00	1	2.333880E+00	4.000(15)	1.000(18)
16	T(VAS)			3.057692E+01	8	3.822114E+00	2.000(16)	
17	VASX	TX(VAS)	2.7241	8.233662E+00	1	8.233662E+00	2.000(17)	1.000(18)
18	TX(VAS)			2.418057E+01	8	3.022571E+00	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - SERIOUSNESS OF ENERGY PROBLEM

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	17.5560	8.815800E+00	1	8.815800E+00	32.000(1)	2.000(16)
2	V	T(VAS)	2.5721	1.292028E+00	1	1.292028E+00	16.000(2)	2.000(16)
3	A	T(VAS)	3.0153	1.514670E+00	1	1.514670E+00	16.000(3)	2.000(16)
4	S	T(VAS)	.2707	1.359811E-01	1	1.359811E-01	16.000(4)	2.000(16)
5	X	TX(VAS)	8.8111	5.654864E+00	1	5.654864E+00	16.000(5)	1.000(18)
6	VA	T(VAS)	.1178	5.916800E-02	1	5.916800E-02	8.000(6)	2.000(16)
7	VS	T(VAS)	.1255	6.356450E-02	1	6.356450E-02	8.000(7)	2.000(16)
8	AS	T(VAS)	4.2117	2.115624E+00	1	2.115624E+00	8.000(8)	2.000(16)
9	VX	TX(VAS)	.1652	1.060301E-01	1	1.060301E-01	8.000(9)	1.000(18)
10	AX	TX(VAS)	1.9142	1.228528E+00	1	1.228528E+00	8.000(10)	1.000(18)
11	SX	TX(VAS)	1.8802	1.206681E+00	1	1.206681E+00	8.000(11)	1.000(18)
12	VAS	T(VAS)	.4277	2.148401E-01	1	2.148401E-01	4.000(12)	2.000(16)
13	VAX	TX(VAS)	1.3947	8.951220E-01	1	8.951220E-01	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.2707	1.776080E-01	1	1.776080E-01	4.000(14)	1.000(18)
15	ASX	TX(VAS)	.3171	2.035220E-01	1	2.035220E-01	4.000(15)	1.000(18)
16	T(VAS)			4.018540E+00	8	5.023237E-01	2.000(16)	
17	VASX	TX(VAS)	5.0714	3.255076E+00	1	3.255076E+00	2.000(17)	1.000(18)
18	TX(VAS)			5.134325E+00	8	6.417906E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - VALUING ENVIRONMENT

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	4.8974	2.458653E+00	1	2.458653E+00	32.000(1)	2.000(16)
2	V	T(VAS)	6.5220	3.274240E+00	1	3.274240E+00	16.000(2)	2.000(16)
3	A	T(VAS)	.0004	2.101250E-04	1	2.101250E-04	16.000(3)	2.000(16)
4	S	T(VAS)	1.2762	6.407120E-01	1	6.407120E-01	16.000(4)	2.000(16)
5	X	TX(VAS)	1.4376	1.306536E+00	1	1.306536E+00	16.000(5)	1.000(18)
6	VA	T(VAS)	1.7670	8.871120E-01	1	8.871120E-01	8.000(6)	2.000(16)
7	VS	T(VAS)	2.4596	1.234806E+00	1	1.234806E+00	8.000(7)	2.000(16)
8	AS	T(VAS)	.0316	1.602050E-02	1	1.602050E-02	8.000(8)	2.000(16)
9	VX	TX(VAS)	.1022	9.288050E-02	1	9.288050E-02	8.000(9)	1.000(18)
10	AX	TX(VAS)	.0517	4.697112E-02	1	4.697112E-02	8.000(10)	1.000(18)
11	SX	TX(VAS)	.3735	3.394880E-01	1	3.394880E-01	8.000(11)	1.000(18)
12	VAS	T(VAS)	.7103	3.565901E-01	1	3.565901E-01	4.000(12)	2.000(16)
13	VAX	TX(VAS)	1.5454	1.404486E+00	1	1.404486E+00	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.4159	3.780151E-01	1	3.780151E-01	4.000(14)	1.000(18)
15	ASX	TX(VAS)	.7673	6.973805E-01	1	6.973805E-01	4.000(15)	1.000(18)
16	T(VAS)			4.016265E+00	8	5.020332E-01	2.000(16)	
17	VASX	TX(VAS)	.2132	1.937531E-01	1	1.937531E-01	2.000(17)	1.000(18)
18	TX(VAS)			7.270611E+00	8	9.088264E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - ABILITY TO HELP

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	5.2573	2.350112E+00	1	2.350112E+00	32.000(1)	2.000(16)
2	V	T(VAS)	1.5207	6.797780E-01	1	6.797780E-01	16.000(2)	2.000(16)
3	A	T(VAS)	4.1233	1.843200E+00	1	1.843200E+00	16.000(3)	2.000(16)
4	S	T(VAS)	.7827	3.498661E-01	1	3.498661E-01	16.000(4)	2.000(16)
5	X	TX(VAS)	4.4931	4.199202E+00	1	4.199202E+00	16.000(5)	1.000(18)
6	VA	T(VAS)	.0011	4.805000E-04	1	4.805000E-04	8.000(6)	2.000(16)
7	VS	T(VAS)	2.1876	9.779011E-01	1	9.779011E-01	8.000(7)	2.000(16)
8	AS	T(VAS)	4.0740	1.821186E+00	1	1.821186E+00	8.000(8)	2.000(16)
9	VX	TX(VAS)	.0027	2.520500E-03	1	2.520500E-03	8.000(9)	1.000(18)
10	AX	TX(VAS)	.4727	4.427405E-01	1	4.427405E-01	8.000(10)	1.000(18)
11	SX	TX(VAS)	.4290	4.018561E-01	1	4.018561E-01	8.000(11)	1.000(18)
12	VAS	T(VAS)	13.5028	6.036075E+00	1	6.036075E+00	4.000(12)	2.000(16)
13	VAX	TX(VAS)	2.7289	2.556060E+00	1	2.556060E+00	4.000(13)	1.000(18)
14	VSX	TX(VAS)	1.1527	1.079715E+00	1	1.079715E+00	4.000(14)	1.000(18)
15	ASX	TX(VAS)	1.5075	1.412040E+00	1	1.412040E+00	4.000(15)	1.000(18)
16	T(VAS)			3.576181E+00	8	4.470226E-01	2.000(16)	
17	VASX	TX(VAS)	.0518	4.851612E-02	1	4.851612E-02	2.000(17)	1.000(18)
18	TX(VAS)			7.493377E+00	8	9.366721E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - ENERGY TRADEOFF

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	.1610	1.365031E-01	1	1.365031E-01	32.000(1)	2.000(16)
2	V	T(VAS)	1.7799	1.508584E+00	1	1.508584E+00	16.000(2)	2.000(16)
3	A	T(VAS)	.0071	6.050000E-03	1	6.050000E-03	16.000(3)	2.000(16)
4	S	T(VAS)	.0454	3.850312E-02	1	3.850312E-02	16.000(4)	2.000(16)
5	X	TX(VAS)	3.3099	1.467184E+00	1	1.467184E+00	16.000(5)	1.000(18)
6	VA	T(VAS)	5.7848	4.903146E+00	1	4.903146E+00	8.000(6)	2.000(16)
7	VS	T(VAS)	3.3922	2.875202E+00	1	2.875202E+00	8.000(7)	2.000(16)
8	AS	T(VAS)	.0022	1.860500E-03	1	1.860500E-03	8.000(8)	2.000(16)
9	VX	TA(VAS)	6.9515	3.081403E+00	1	3.081403E+00	8.000(9)	1.000(18)
10	AX	TX(VAS)	1.4339	6.356281E-01	1	6.356281E-01	8.000(10)	1.000(18)
11	SX	TA(VAS)	.0231	1.022450E-02	1	1.022450E-02	8.000(11)	1.000(18)
12	VAS	T(VAS)	1.0569	8.957911E-01	1	8.957911E-01	4.000(12)	2.000(16)
13	VAX	TA(VAS)	3.6913	1.636240E+00	1	1.636240E+00	4.000(13)	1.000(18)
14	VSX	TA(VAS)	4.0356	1.788886E+00	1	1.788886E+00	4.000(14)	1.000(18)
15	ASX	TA(VAS)	.2402	1.064911E-01	1	1.064911E-01	4.000(15)	1.000(18)
16	T(VAS)			6.780679E+00	8	8.475849E-01	2.000(16)	
17	VASX	TA(VAS)	1.3723	5.083045E-01	1	6.083045E-01	2.000(17)	1.000(18)
18	TX(VAS)			3.546179E+00	8	4.432724E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - GROWTH TRADEOFF

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	.0003	1.162812E-04	1	1.162812E-04	32.000(1)	2.000(16)
2	V	T(VAS)	.0613	2.838153E-02	1	2.838153E-02	16.000(2)	2.000(16)
3	A	T(VAS)	.1662	7.693003E-02	1	7.693003E-02	16.000(3)	2.000(16)
4	S	T(VAS)	3.1815	1.472757E+00	1	1.472757E+00	16.000(4)	2.000(16)
5	X	TA(VAS)	1.3476	3.154165E-01	1	3.154165E-01	16.000(5)	1.000(18)
6	VA	T(VAS)	6.5910	3.051068E+00	1	3.051068E+00	8.000(6)	2.000(16)
7	VS	T(VAS)	.1214	5.619628E-02	1	5.619628E-02	8.000(7)	2.000(16)
8	AS	T(VAS)	1.2050	5.578320E-01	1	5.578320E-01	8.000(8)	2.000(16)
9	VX	TA(VAS)	1.9533	4.572070E-01	1	4.572070E-01	8.000(9)	1.000(18)
10	AX	TX(VAS)	.2936	6.872778E-02	1	6.872778E-02	8.000(10)	1.000(18)
11	SX	TA(VAS)	.6491	1.519383E-01	1	1.519383E-01	8.000(11)	1.000(18)
12	VAS	T(VAS)	.0047	2.161531E-03	1	2.161531E-03	4.000(12)	2.000(16)
13	VAX	TX(VAS)	11.2782	2.639828E+00	1	2.639828E+00	4.000(13)	1.000(18)
14	VSX	TX(VAS)	2.6379	6.174383E-01	1	6.174383E-01	4.000(14)	1.000(18)
15	ASX	TX(VAS)	.0226	5.278781E-03	1	5.278781E-03	4.000(15)	1.000(18)
16	T(VAS)			3.703296E+00	8	4.629120E-01	2.000(16)	
17	VASX	TX(VAS)	3.2436	7.592200E-01	1	7.592200E-01	2.000(17)	1.000(18)
18	TX(VAS)			1.872516E+00	8	2.340645E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - CONSUMPTION TRADEOFF

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	.2602	1.366338E-01	1	1.366338E-01	32.000(1)	2.000(16)
2	V	T(VAS)	3.1708	1.664856E+00	1	1.664856E+00	16.000(2)	2.000(16)
3	A	T(VAS)	2.0431	1.072746E+00	1	1.072746E+00	16.000(3)	2.000(16)
4	S	T(VAS)	13.0632	6.858882E+00	1	6.858882E+00	16.000(4)	2.000(16)
5	X	TX(VAS)	.5447	2.068853E-01	1	2.068853E-01	16.000(5)	1.000(18)
6	VA	T(VAS)	.4583	2.406445E-01	1	2.406445E-01	8.000(6)	2.000(16)
7	VS	T(VAS)	1.1538	6.058253E-01	1	6.058253E-01	8.000(7)	2.000(16)
8	AS	T(VAS)	.0308	1.615503E-02	1	1.615503E-02	8.000(8)	2.000(16)
9	VX	TX(VAS)	1.9523	7.414575E-01	1	7.414575E-01	8.000(9)	1.000(18)
10	AX	TX(VAS)	1.0109	3.839070E-01	1	3.839070E-01	8.000(10)	1.000(18)
11	SX	TX(VAS)	.0811	3.081403E-02	1	3.081403E-02	8.000(11)	1.000(18)
12	VAS	T(VAS)	.0303	1.588653E-02	1	1.588653E-02	4.000(12)	2.000(16)
13	VAX	TX(VAS)	4.6941	1.782744E+00	1	1.782744E+00	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.3814	1.448565E-01	1	1.448565E-01	4.000(14)	1.000(18)
15	ASX	TX(VAS)	.4479	1.700903E-01	1	1.700903E-01	4.000(15)	1.000(18)
16	T(VAS)			4.200433E+00	8	5.250541E-01	2.000(16)	
17	VASX	TX(VAS)	.2414	9.169903E-02	1	9.169903E-02	2.000(17)	1.000(18)
18	TX(VAS)			3.038281E+00	8	3.797851E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - CONSERVATION TRADEOFF

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	3.7224	5.322540E-01	1	5.322540E-01	32.000(1)	2.000(16)
2	V	T(VAS)	1.0415	1.489215E-01	1	1.489215E-01	16.000(2)	2.000(16)
3	A	T(VAS)	1.9999	2.859570E-01	1	2.859570E-01	16.000(3)	2.000(16)
4	S	T(VAS)	9.1741	1.311795E+00	1	1.311795E+00	16.000(4)	2.000(16)
5	X	TX(VAS)	.1884	1.214013E-01	1	1.214013E-01	16.000(5)	1.000(18)
6	VA	T(VAS)	8.4961	1.214851E+00	1	1.214851E+00	8.000(6)	2.000(16)
7	VS	T(VAS)	1.1133	1.591890E-01	1	1.591890E-01	8.000(7)	2.000(16)
8	AS	T(VAS)	.0058	8.302813E-04	1	8.302813E-04	8.000(8)	2.000(16)
9	VX	TX(VAS)	.0034	2.194531E-03	1	2.194531E-03	8.000(9)	1.000(18)
10	AX	TX(VAS)	.0431	2.778903E-02	1	2.778903E-02	8.000(10)	1.000(18)
11	SX	TX(VAS)	.0043	2.756531E-03	1	2.756531E-03	8.000(11)	1.000(18)
12	VAS	T(VAS)	3.4567	4.942665E-01	1	4.942665E-01	4.000(12)	2.000(16)
13	VAX	TX(VAS)	.3043	1.960945E-01	1	1.960945E-01	4.000(13)	1.000(18)
14	VSX	TX(VAS)	3.6574	2.357163E+00	1	2.357163E+00	4.000(14)	1.000(18)
15	ASX	TX(VAS)	.2941	1.895740E-01	1	1.895740E-01	4.000(15)	1.000(18)
16	T(VAS)			1.143907E+00	8	1.429884E-01	2.000(16)	
17	VASX	TX(VAS)	1.9570	1.261269E+00	1	1.261269E+00	2.000(17)	1.000(18)
18	TX(VAS)			5.155919E+00	8	6.444899E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - POLITICAL/LEGAL SOLUTIONS

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	18.7290	1.910084E+01	1	1.910084E+01	32.000(1)	2.000(16)
2	V	T(VAS)	.6691	6.824040E-01	1	6.824040E-01	16.000(2)	2.000(16)
3	A	T(VAS)	2.4059	2.453666E+00	1	2.453666E+00	16.000(3)	2.000(16)
4	S	T(VAS)	.2760	2.814375E-01	1	2.814375E-01	16.000(4)	2.000(16)
5	X	TX(VAS)	2.0814	3.496029E+00	1	3.496029E+00	16.000(5)	1.000(18)
6	VA	T(VAS)	2.3734	2.420550E+00	1	2.420550E+00	8.000(6)	2.000(16)
7	VS	T(VAS)	.7348	7.493940E-01	1	7.493940E-01	8.000(7)	2.000(16)
8	AS	T(VAS)	2.1023	2.144003E+00	1	2.144003E+00	8.000(8)	2.000(16)
9	VX	TX(VAS)	1.6880	2.835176E+00	1	2.835176E+00	8.000(9)	1.000(18)
10	AX	TX(VAS)	.0059	9.835031E-03	1	9.835031E-03	8.000(10)	1.000(18)
11	SX	TX(VAS)	.0175	2.946378E-02	1	2.946378E-02	8.000(11)	1.000(18)
12	VAS	T(VAS)	2.2975	2.343071E+00	1	2.343071E+00	4.000(12)	2.000(16)
13	VAX	TX(VAS)	7.4664	1.257654E+01	1	1.257654E+01	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.2280	3.839313E-01	1	3.839313E-01	4.000(14)	1.000(18)
15	ASX	TX(VAS)	.3950	6.651465E-01	1	6.651465E-01	4.000(15)	1.000(18)
16	T(VAS)			8.158838E+00	8	1.019855E+00	2.000(16)	
17	VASX	TX(VAS)	5.6158	9.434082E+00	1	9.434082E+00	2.000(17)	1.000(18)
18	TX(VAS)			1.343540E+01	8	1.679513E+00	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - PERSONAL SOLUTIONS

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	.0739	7.900312E-02	1	7.900312E-02	32.000(1)	2.000(16)
2	V	T(VAS)	.4155	4.441531E-01	1	4.441531E-01	16.000(2)	2.000(16)
3	A	T(VAS)	2.9481	3.151305E+00	1	3.151305E+00	16.000(3)	2.000(16)
4	S	T(VAS)	.2188	2.339280E-01	1	2.339280E-01	16.000(4)	2.000(16)
5	X	TX(VAS)	1.1378	2.497612E+00	1	2.497612E+00	16.000(5)	1.000(18)
6	VA	T(VAS)	10.4540	1.117463E+01	1	1.117463E+01	8.000(6)	2.000(16)
7	VS	T(VAS)	1.0694	1.143072E+00	1	1.143072E+00	8.000(7)	2.000(16)
8	AS	T(VAS)	1.3486	1.441602E+00	1	1.441602E+00	8.000(8)	2.000(16)
9	VX	TX(VAS)	1.6778	3.682898E+00	1	3.682898E+00	8.000(9)	1.000(18)
10	AX	TX(VAS)	.0026	5.618000E-03	1	5.618000E-03	8.000(10)	1.000(18)
11	SX	TX(VAS)	.0382	8.384513E-02	1	8.384513E-02	8.000(11)	1.000(18)
12	VAS	T(VAS)	.1038	1.109205E-01	1	1.109205E-01	4.000(12)	2.000(16)
13	VAX	TX(VAS)	6.2162	1.364509E+01	1	1.364509E+01	4.000(13)	1.000(18)
14	VSX	TX(VAS)	.0003	7.031250E-04	1	7.031250E-04	4.000(14)	1.000(18)
15	ASX	TX(VAS)	1.8339	4.025703E+00	1	4.025703E+00	4.000(15)	1.000(18)
16	T(VAS)			8.551452E+00	8	1.068931E+00	2.000(16)	
17	VASX	TX(VAS)	2.5842	5.683506E+00	1	5.683506E+00	2.000(17)	1.000(18)
18	TX(VAS)			1.756080E+01	8	2.195100E+00	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - EDUCATION SOLUTIONS

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	.0004	2.000000E-04	1	2.000000E-04	32.000(1)	2.000(16)
2	V	T(VAS)	.6301	3.034205E-01	1	3.034205E-01	16.000(2)	2.000(16)
3	A	T(VAS)	2.4273	1.168920E+00	1	1.168920E+00	16.000(3)	2.000(16)
4	S	T(VAS)	1.4237	6.856205E-01	1	6.856205E-01	16.000(4)	2.000(16)
5	X	TX(VAS)	.4649	1.215245E-01	1	1.215245E-01	16.000(5)	1.000(18)
6	VA	T(VAS)	2.4624	1.185800E+00	1	1.185800E+00	8.000(6)	2.000(16)
7	VS	T(VAS)	.0000	4.500000E-06	1	4.500000E-06	8.000(7)	2.000(16)
8	AS	T(VAS)	.0001	7.200000E-05	1	7.200000E-05	8.000(8)	2.000(16)
9	VX	TX(VAS)	.1862	4.867200E-02	1	4.867200E-02	8.000(9)	1.000(18)
10	AX	TX(VAS)	1.3147	3.436205E-01	1	3.436205E-01	8.000(10)	1.000(18)
11	SX	TX(VAS)	.1576	4.118450E-02	1	4.118450E-02	8.000(11)	1.000(18)
12	VAS	T(VAS)	.9058	4.361780E-01	1	4.361780E-01	4.000(12)	2.000(16)
13	VAX	TX(VAS)	11.0555	2.889608E+00	1	2.889608E+00	4.000(13)	1.000(18)
14	VSX	TX(VAS)	1.2957	3.386645E-01	1	3.386645E-01	4.000(14)	1.000(18)
15	ASX	TX(VAS)	6.8986	1.803100E+00	1	1.803100E+00	4.000(15)	1.000(18)
16	T(VAS)			3.852518E+00	8	4.815647E-01	2.000(16)	
17	VASX	TX(VAS)	1.7228	4.503005E-01	1	4.503005E-01	2.000(17)	1.000(18)
18	TX(VAS)			2.090977E+00	8	2.613721E-01	1.000(18)	

ANALYSIS OF VARIANCE FOR DEPENDENT VARIABLE - LIFE STYLE SOLUTIONS

	SOURCE	ERROR TERM	F	SUM OF SQUARES	DEG. OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE	
1	MEAN	T(VAS)	1.2785	5.989651E-01	1	5.989651E-01	32.000(1)	2.000(16)
2	V	T(VAS)	1.6890	7.912820E-01	1	7.912820E-01	16.000(2)	2.000(16)
3	A	T(VAS)	.0870	4.075512E-02	1	4.075512E-02	16.000(3)	2.000(16)
4	S	T(VAS)	.6369	2.983781E-01	1	2.983781E-01	16.000(4)	2.000(16)
5	X	TX(VAS)	2.8720	4.955101E-01	1	4.955101E-01	16.000(5)	1.000(18)
6	VA	T(VAS)	.0584	2.737800E-02	1	2.737800E-02	8.000(6)	2.000(16)
7	VS	T(VAS)	.0122	5.724500E-03	1	5.724500E-03	8.000(7)	2.000(16)
8	AS	T(VAS)	.2516	1.178551E-01	1	1.178551E-01	8.000(8)	2.000(16)
9	VX	TX(VAS)	4.4344	7.650845E-01	1	7.650845E-01	8.000(9)	1.000(18)
10	AX	TX(VAS)	1.0071	1.737551E-01	1	1.737551E-01	8.000(10)	1.000(18)
11	SX	TX(VAS)	2.3084	3.982781E-01	1	3.982781E-01	8.000(11)	1.000(18)
12	VAS	T(VAS)	.9774	4.579245E-01	1	4.579245E-01	4.000(12)	2.000(16)
13	VAX	TX(VAS)	.4707	8.120450E-02	1	8.120450E-02	4.000(13)	1.000(18)
14	VSX	TX(VAS)	4.9884	8.606720E-01	1	8.606720E-01	4.000(14)	1.000(18)
15	ASX	TX(VAS)	3.4526	5.956861E-01	1	5.956861E-01	4.000(15)	1.000(18)
16	T(VAS)			3.748032E+00	8	4.685041E-01	2.000(16)	
17	VASX	TX(VAS)	.1811	3.125000E-02	1	3.125000E-02	2.000(17)	1.000(18)
18	TX(VAS)			1.380248E+00	8	1.725336E-01	1.000(18)	

APPENDIX C-2

KEY TO READING ONE-WAY ANOVAS PRINTOUT

Dependent Variables

GEN KNOW	Knowledge of general environmental issues
ENERGY	Knowledge of energy issues
LANDUSE	Knowledge of land use issues
TOTAL	Total score on the knowledge test
BLF EGY	Belief in the seriousness and importance of energy problems
BLF ENV	Belief in the seriousness and importance of environmental problems
VALUE	Valuing and appreciating the natural environment
ABILITY	Ability to help solve environmental/energy problems
ENERGY	Energy vs environment tradeoff
GROWTH	Growth vs environment tradeoff
CONSUM	Consumption of natural resources vs environment tradeoff
CONSERV	Conservation vs use of natural resources tradeoff
POL SOL	Supporting certain political/legal solutions
PER SOL	Supporting certain personal solutions
ED SOL	Supporting certain educational solutions
LIF SOL	Supporting certain life style solutions

Independent Variables

VAL	The treatments	VAL 1 = Values Clarification VAL 2 = Social Science Inquiry
SEX	Sex of the students	SEX 1 = Male SEX 2 = Female
GAD	Grade Level of students	GAD 9 = 9th grade students GAD 10 = 10th grade students GAD 11 = 11th grade students GAD 12 = 12th grade students
A4	Prior knowledge of environmental issues	A4 1 = Low prior knowledge A4 2 = Medium prior knowledge A4 3 = High prior knowledge
A5	Faith in human nature	A5 1 = Low faith in human nature A5 2 = Medium faith in human nature A5 3 = High faith in human nature
A6	Locus of Control	A6 1 = Low internal locus of control A6 2 = Medium internal locus of control A6 3 = High internal locus of control

Independent Variables continued

A12	Locus of control	A12 1 = Low internal locus of control A12 2 = Medium internal locus of control A12 3 = High internal locus of control
A13	Faith in human nautre	A13 1 = Low faith in human nature A13 2 = Medium faith in human nature A13 3 = High faith in human nature
HP	Prior knowledge of environmental issues	HP 1 = Low prior knowledge HP 2 = Medium prior knowledge HP 3 = High prior knowledge

APPENDIX C-3

ONE-WAY ANOVAS - ATI RESULTS

Cognitive Results

- - - ANOVA - - -

GENKNOW
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	2.535	2	1.267	.230	.795
VAL	.309	1	.309	.056	.813
SEX	2.016	1	2.016	.365	.546
2-WAY INTERACTION	.037	1	.037	.007	.934
VAL SEX	.037	1	.037	.007	.934
EXPLAINED	2.572	3	.857	.155	.926
RESIDUAL	916.022	166	5.518		
TOTAL	918.594	169	5.435		

172 CASES
2 MISSING (1.2 PCT)

ENERGY
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	9.628	2	4.814	.640	.529
VAL	.139	1	.139	.019	.892
SEX	9.627	1	9.627	1.279	.260
2-WAY INTERACTION	.247	1	.247	.033	.856
VAL SEX	.247	1	.247	.033	.856
EXPLAINED	9.875	3	3.292	.437	.727
RESIDUAL	1249.513	166	7.527		
TOTAL	1259.388	169	7.452		

172 CASES
2 MISSING (1.2 PCT)

LANDUSE
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	12.344	2	6.172	.680	.508
VAL	.741	1	.741	.082	.775
SEX	10.811	1	10.811	1.191	.277
2-WAY INTERACTION	29.820	1	29.820	3.285	.072
VAL SEX	29.820	1	29.820	3.285	.072
EXPLAINED	42.164	3	14.055	1.548	.204
RESIDUAL	1506.989	166	9.078		
TOTAL	1549.153	169	9.167		

172 CASES
2 MISSING (1.2 PCT)

TOTAL
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	1.819	2	.910	.033	.968
VAL	.460	1	.460	.017	.897
SEX	1.524	1	1.524	.055	.814
2-WAY INTERACTION	26.596	1	26.596	.966	.327
VAL SEX	26.596	1	26.596	.966	.327
EXPLAINED	28.416	3	9.472	.344	.794
RESIDUAL	4572.296	166	27.544		
TOTAL	4600.712	169	27.223		

172 CASES
2 MISSING (1.2 PCT)

GENKNOW
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	35.259	4	8.815	1.659	.162
VAL	.120	1	.120	.023	.881
GAD	35.091	3	11.697	2.201	.090
2-WAY INTERACTION	19.824	3	6.608	1.243	.296
VAL GAD	19.824	3	6.608	1.243	.296
EXPLAINED	55.083	7	7.869	1.481	.177
RESIDUAL	871.586	164	5.315		
TOTAL	926.669	171	5.419		

172 CASES
0 MISSING (0 PCT)

ENERGY
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	53.009	4	13.252	1.805	.130
VAL	.007	1	.007	.001	.975
GAD	52.683	3	17.628	2.400	.070
2-WAY INTERACTION	18.008	3	6.003	.817	.486
VAL GAD	18.008	3	6.003	.817	.486
EXPLAINED	71.016	7	10.145	1.381	.216
RESIDUAL	1204.396	164	7.344		
TOTAL	1275.413	171	7.459		

172 CASES
0 MISSING (0 PCT)

LANDUSE
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	20.404	4	5.101	.552	.698
VAL	2.265	1	2.265	.245	.621
GAD	18.698	3	6.233	.675	.569
2-WAY INTERACTION	15.539	3	5.180	.561	.642
VAL GAD	15.539	3	5.180	.561	.642
EXPLAINED	35.943	7	5.135	.556	.791
RESIDUAL	1514.354	164	9.234		
TOTAL	1550.297	171	9.066		

172 CASES
0 MISSING (0 PCT)

TOTAL
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	172.714	4	43.178	1.603	.176
VAL	1.544	1	1.544	.057	.811
GAD	172.420	3	57.473	2.133	.098
2-WAY INTERACTION	11.439	3	3.813	.142	.935
VAL GAD	11.439	3	3.813	.142	.935
EXPLAINED	184.153	7	26.308	.976	.450
RESIDUAL	4418.376	164	26.941		
TOTAL	4602.529	171	26.915		

172 CASES
0 MISSING (0 PCT)

GENKNOW
BY VAL
A4

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	49.493	3	16.498	3.285	.022
VAL	2.165	1	2.165	.431	.512
A4	49.325	2	24.662	4.911	.008
2-WAY INTERACTION	43.547	2	21.774	4.336	.015
VAL A4	43.547	2	21.774	4.336	.015
EXPLAINED	93.040	5	18.608	3.705	.003
RESIDUAL	833.628	166	5.022		
TOTAL	926.669	171	5.419		

172 CASES
0 MISSING (0 PCT)

ENERGY
BY VAL
A4

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	3.354	3	1.118	.146	.932
VAL	.001	1	.001	.000	.990
A4	3.229	2	1.615	.211	.810
2-WAY INTERACTION	1.544	2	.772	.101	.904
VAL A4	1.544	2	.772	.101	.904
EXPLAINED	4.898	5	.980	.128	.986
RESIDUAL	1270.515	166	7.654		
TOTAL	1275.413	171	7.459		

172 CASES
0 MISSING (0 PCT)

LANDUSE
BY VAL
A4

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	44.047	3	14.682	1.622	.186
VAL	2.285	1	2.285	.252	.616
A4	42.342	2	21.171	2.338	.100
2-WAY INTERACTION	3.191	2	1.596	.176	.839
VAL A4	3.191	2	1.596	.176	.839
EXPLAINED	47.239	5	9.448	1.043	.394
RESIDUAL	1503.058	166	9.055		
TOTAL	1550.297	171	9.066		

172 CASES
0 MISSING (0 PCT)

TOTAL
BY VAL
A4

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	154.059	3	51.353	1.949	.124
VAL	8.690	1	8.690	.330	.567
A4	153.766	2	76.883	2.918	.057
2-WAY INTERACTION	75.413	2	37.706	1.431	.242
VAL A4	75.413	2	37.706	1.431	.242
EXPLAINED	229.472	5	45.894	1.742	.128
RESIDUAL	4373.057	166	26.344		
TOTAL	4602.529	171	26.915		

172 CASES
0 MISSING (0 PCT)

GENKNOW
BY VAL
A5

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	21.450	3	7.153	1.345	.261
VAL	.257	1	.257	.048	.826
A5	21.291	2	10.645	2.002	.138
2-WAY INTERACTION	22.591	2	11.295	2.124	.123
VAL A5	22.591	2	11.295	2.124	.123
EXPLAINED	44.050	5	8.810	1.657	.148
RESIDUAL	882.618	166	5.317		
TOTAL	926.669	171	5.419		

172 CASES
0 MISSING (0 PCT)

ENERGY
BY VAL
A5

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	31.288	3	10.429	1.399	.245
VAL	.319	1	.319	.043	.836
A5	31.163	2	15.581	2.090	.127
2-WAY INTERACTION	6.700	2	3.350	.449	.639
VAL A5	6.700	2	3.350	.449	.639
EXPLAINED	37.988	5	7.598	1.019	.408
RESIDUAL	1237.425	166	7.454		
TOTAL	1275.413	171	7.459		

172 CASES
0 MISSING (0 PCT)

LANDUSE
BY VAL
A5

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	21.945	3	7.315	.811	.489
VAL	1.526	1	1.526	.169	.681
A5	20.239	2	10.119	1.122	.328
2-WAY INTERACTION	30.967	2	15.483	1.716	.183
VAL A5	30.967	2	15.483	1.716	.183
EXPLAINED	52.912	5	10.582	1.173	.325
RESIDUAL	1497.385	166	9.020		
TOTAL	1550.297	171	9.066		

172 CASES
0 MISSING (0 PCT)

TOTAL
BY VAL
A5

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	169.777	3	56.592	2.158	.095
VAL	.027	1	.027	.001	.974
A5	169.484	2	84.742	3.232	.042
2-WAY INTERACTION					
VAL A5	80.372	2	40.186	1.533	.219
EXPLAINED	250.149	5	50.030	1.908	.096
RESIDUAL	4352.380	166	26.219		
TOTAL	4602.529	171	26.915		

172 CASES
0 MISSING (0 PCT)

GENKNOW
BY VAL
A6

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	.988	3	.329	.059	.981
VAL	.201	1	.201	.036	.849
A6	.819	2	.410	.074	.929
2-WAY INTERACTION	3.937	2	1.968	.354	.702
VAL A6	3.937	2	1.968	.354	.702
EXPLAINED	4.924	5	.985	.177	.971
RESIDUAL	921.744	166	5.553		
TOTAL	926.669	171	5.419		

172 CASES
0 MISSING (0 PCT)

ENERGY
BY VAL
A6

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	12.456	3	4.152	.551	.648
VAL	.063	1	.063	.008	.928
A6	12.331	2	6.166	.818	.443
2-WAY INTERACTION	11.454	2	5.727	.760	.469
VAL A6	11.454	2	5.727	.760	.469
EXPLAINED	23.911	5	4.782	.634	.674
RESIDUAL	1251.502	166	7.539		
TOTAL	1275.413	171	7.459		

172 CASES
0 MISSING (0 PCT)

LANDUSE
BY VAL
A6

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	11.743	3	3.914	.424	.736
VAL	2.380	1	2.380	.258	.612
A6	10.038	2	5.019	.543	.582
2-WAY INTERACTION	4.644	2	2.322	.251	.778
VAL A6	4.644	2	2.322	.251	.778
EXPLAINED	16.387	5	3.277	.355	.879
RESIDUAL	1533.909	166	9.240		
TOTAL	1550.297	171	9.066		

172 CASES
0 MISSING (0 PCT)

TOTAL
BY VAL
A6

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	42.725	3	14.242	.520	.669
VAL	.714	1	.714	.026	.872
A6	42.432	2	21.216	.774	.463
2-WAY INTERACTION	10.849	2	5.425	.198	.821
VAL A6	10.849	2	5.425	.198	.821
EXPLAINED	53.575	5	10.715	.391	.854
RESIDUAL	4548.954	166	27.403		
TOTAL	4602.529	171	26.915		

172 CASES
0 MISSING (0 PCT)

CRITERION VARIABLE GENKNOW
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.808	2.328	172	
VAL	1.	.839	2.641	87	
SEX	0	-1.000	0	1	
SEX	1.	.776	2.806	49	
SEX	2.	.973	2.315	37	
VAL	2.	.776	1.972	85	
SEX	0	3.000	0	1	
SEX	1.	.667	1.930	57	
SEX	2.	.926	2.074	27	

TOTAL CASES = 172

CRITERION VARIABLE GENKNOW
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.808	2.328	172	
VAL	1.	.839	2.641	87	
GAD	9.	-.333	3.386	6	
GAD	10.	1.500	2.236	36	
GAD	11.	.824	2.195	34	
GAD	12.	-.636	4.007	11	
VAL	2.	.776	1.972	85	
GAD	9.	-.250	1.258	4	
GAD	10.	.735	2.165	34	
GAD	11.	1.030	2.008	33	
GAD	12.	.571	1.555	14	

TOTAL CASES = 172

CRITERION VARIABLE GENKNOW
BROKEN DOWN BY VAL
BY A4

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.808	2.328	172	
VAL	1.	.839	2.641	87	
A4	1.	1.065	2.674	31	
A4	2.	1.622	1.722	37	
A4	3.	-1.053	2.915	19	
VAL	2.	.776	1.972	85	
A4	1.	.821	2.178	28	
A4	2.	.895	2.622	19	
A4	3.	.684	1.416	38	

TOTAL CASES = 172

CRITERION VARIABLE GENKNOW
BROKEN DOWN BY VAL
BY A5

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.808	2.328	172	
VAL	1.	.839	2.641	87	
A5	1.	-.065	2.943	31	
A5	2.	1.289	2.426	38	
A5	3.	1.444	2.202	18	
VAL	2.	.776	1.972	85	
A5	1.	.786	1.771	28	
A5	2.	.973	2.141	37	
A5	3.	.400	1.957	20	

TOTAL CASES = 172

CRITERION VARIABLE GENKNOW
BROKEN DOWN BY VAL
BY A6

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.808	2.328	172	
VAL	1.	.839	2.641	87	
A6	1.	.567	3.510	30	
A6	2.	.920	2.216	25	
A6	3.	1.031	1.975	32	
VAL	2.	.776	1.972	85	
A6	1.	.957	2.325	23	
A6	2.	.655	1.895	29	
A6	3.	.758	1.821	33	

TOTAL CASES = 172

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.180	2.731	172	
VAL	1.	1.207	3.001	87	
SEX	0	5.000	0	1	
SEX	1.	.918	3.115	49	
SEX	2.	1.486	2.825	37	
VAL	2.	1.153	2.442	85	
SEX	0	0	0	1	
SEX	1.	1.035	2.435	57	
SEX	2.	1.444	2.517	27	

TOTAL CASES = 172

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.180	2.731	172	
VAL	1.	1.207	3.001	87	
GAD	9.	3.000	4.290	6	
GAD	10.	1.556	2.971	36	
GAD	11.	1.059	1.969	34	
GAD	12.	-.455	4.367	11	
VAL	2.	1.153	2.442	85	
GAD	9.	1.000	3.830	4	
GAD	10.	1.676	1.736	34	
GAD	11.	.848	3.012	33	
GAD	12.	.643	1.985	14	

TOTAL CASES = 172

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY A4

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.180	2.731	172	
VAL	1.	1.207	3.001	87	
A4	1.	1.452	3.623	31	
A4	2.	1.189	2.504	37	
A4	3.	.842	2.892	19	
VAL	2.	1.153	2.442	85	
A4	1.	1.214	2.794	28	
A4	2.	1.211	3.047	19	
A4	3.	1.079	1.822	38	

TOTAL CASES = 172

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY A5

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.180	2.731	172	
VAL	1.	1.207	3.001	87	
A5	1.	.871	2.849	31	
A5	2.	1.026	2.716	38	
A5	3.	2.167	3.730	18	
VAL	2.	1.153	2.442	85	
A5	1.	.536	2.603	28	
A5	2.	1.378	2.509	37	
A5	3.	1.600	1.984	20	

TOTAL CASES = 172

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY A6

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.180	2.731	172	
VAL	1.	1.207	3.001	87	
A6	1.	.900	3.604	30	
A6	2.	1.120	2.728	25	
A6	3.	1.563	2.614	32	
VAL	2.	1.153	2.442	85	
A6	1.	1.609	1.901	23	
A6	2.	.552	2.443	29	
A6	3.	1.364	2.725	33	

TOTAL CASES = 172

CRITERION VARIABLE LANDUSE
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.064	3.011	172	
VAL	1.	.966	3.175	87	
SEX	0	0	0	1	
SEX	1.	1.551	3.304	49	
SEX	2.	.216	2.907	37	
VAL	2.	1.165	2.849	85	
SEX	0	1.000	0	1	
SEX	1.	1.035	3.024	57	
SEX	2.	1.444	2.532	27	

TOTAL CASES = 172

CRITERION VARIABLE LANDUSE
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N VALUE LABEL
FOR ENTIRE POPULATION		1.064	3.011	172
VAL	1.	.966	3.175	87
GAD	9.	1.833	3.656	6
GAD	10.	.889	3.631	36
GAD	11.	.706	2.802	34
GAD	12.	1.545	2.622	11
VAL	2.	1.165	2.849	85
GAD	9.	2.500	2.646	4
GAD	10.	1.588	3.135	34
GAD	11.	.879	2.342	33
GAD	12.	.429	3.251	14

TOTAL CASES = 172

CRITERION VARIABLE LANDUSE
BROKEN DOWN BY VAL
BY A4

VARIABLE	CODE	MEAN	STD. DEV.	N VALUE LABEL
FOR ENTIRE POPULATION		1.064	3.011	172
VAL	1.	.966	3.175	87
A4	1.	1.548	3.837	31
A4	2.	.757	2.900	37
A4	3.	.421	2.411	19
VAL	2.	1.165	2.849	85
A4	1.	1.964	2.715	28
A4	2.	.579	3.863	19
A4	3.	.868	2.244	38

TOTAL CASES = 172

CRITERION VARIABLE LANDUSE
BROKEN DOWN BY VAL
BY A5

VARIABLE	CODE	MEAN	STD. DEV.	N VALUE LABEL
FOR ENTIRE POPULATION		1.064	3.011	172
VAL	1.	.966	3.175	87
A5	1.	0	2.422	31
A5	2.	1.711	3.204	38
A5	3.	1.056	3.918	18
VAL	2.	1.165	2.849	85
A5	1.	1.321	2.510	28
A5	2.	1.108	3.340	37
A5	3.	1.050	2.395	20

TOTAL CASES = 172

CRITERION VARIABLE LANDUSE
BROKEN DOWN BY VAL
BY A6

VARIABLE	CODE	MEAN	STD. DEV.	N VALUE LABEL
FOR ENTIRE POPULATION		1.064	3.011	172
VAL	1.	.966	3.175	87
A6	1.	1.433	3.070	30
A6	2.	.520	3.268	25
A6	3.	.875	3.240	32
VAL	2.	1.165	2.849	85
A6	1.	1.174	2.64[illegible]	23
A6	2.	.931	2.404	29
A6	3	1.364	3.[illegible]71	33

TOTAL CASES = 172

CRITERION VARIABLE TOTAL
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		3.052	5.188	172	
VAL	1.	3.011	5.650	87	
SEX	0	4.000	0	1	
SEX	1.	3.245	5.964	49	
SEX	2.	2.676	5.349	37	
VAL	2.	3.094	4.702	85	
SEX	0	4.000	0	1	
SEX	1.	2.737	4.410	57	
SEX	2.	3.815	5.357	27	

TOTAL CASES = 172

CRITERION VARIABLE TOTAL
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		3.052	5.188	172	
VAL	1.	3.011	5.650	87	
GAD	9.	4.500	10.193	6	
GAD	10.	3.944	5.356	36	
GAD	11.	2.588	3.448	34	
GAD	12.	.455	8.407	11	
VAL	2.	3.094	4.702	85	
GAD	9.	3.250	6.652	4	
GAD	10.	4.000	4.573	34	
GAD	11.	2.758	4.684	33	
GAD	12.	1.643	4.568	14	

TOTAL CASES = 172

CRITERION VARIABLE TOTAL
BROKEN DOWN BY VAL
BY A4

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		3.052	5.188	172	
VAL	1.	3.011	5.650	87	
A4	1.	4.065	6.708	31	
A4	2.	3.568	3.648	37	
A4	3.	.211	6.330	19	
VAL	2.	3.094	4.702	85	
A4	1.	4.000	5.604	28	
A4	2.	2.684	6.092	19	
A4	3.	2.632	2.880	38	

TOTAL CASES = 172

CRITERION VARIABLE TOTAL
BROKEN DOWN BY VAL
BY A5

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		3.052	5.188	172	
VAL	1.	3.011	5.650	87	
A5	1.	.806	5.394	31	
A5	2.	4.026	5.721	38	
A5	3.	4.667	4.982	18	
VAL	2.	3.094	4.702	85	
A5	1.	2.643	4.103	28	
A5	2.	3.459	5.495	37	
A5	3.	3.050	4.006	20	

TOTAL CASES = 172

CRITERION VARIABLE TOTAL
BROKEN DOWN BY VAL
BY A6

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		3.052	5.188	172	
VAL	1.	3.011	5.650	87	
A6	1.	2.900	7.208	30	
A6	2.	2.560	3.917	25	
A6	3.	3.469	5.261	32	
VAL	2.	3.094	4.702	85	
A6	1.	3.739	4.845	23	
A6	2.	2.138	3.739	29	
A6	3.	3.485	5.328	33	

TOTAL CASES = 172

Affective Results

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END OF FILE ON FILE TAPE72
AFTER READING 312 CASES FROM SUBFILE NONAME

BLF EGY
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	26.350	2	13.175	1.873	.157
VAL	8.957	1	8.957	1.273	.261
SEX	16.722	1	16.722	2.377	.125
2-WAY INTERACTION	.176	1	.176	.025	.874
VAL SEX	.176	1	.176	.025	.874
EXPLAINED	26.526	3	8.842	1.257	.291
RESIDUAL	1104.418	157	7.035		
TOTAL	1130.944	160	7.068		

162 CASES
1 MISSING (.6 PCT)

BLF ENY
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	129.194	2	64.597	4.467	.013
VAL	81.269	1	81.269	5.620	.019
SEX	51.273	1	51.273	3.546	.062
2-WAY INTERACTION	30.546	1	30.546	2.113	.148
VAL SEX	30.546	1	30.546	2.113	.148
EXPLAINED	159.740	3	53.247	3.682	.013
RESIDUAL	2270.148	157	14.459		
TOTAL	2429,888	160	15.187		

162 CASES
1 MISSING (.6 PCT)

VALUE
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	17.405	2	8.702	1.843	.162
VAL	14.495	1	14.495	3.069	.082
SEX	2.517	1	2.517	.533	.466
2-WAY INTERACTION	7.489	1	7.489	1.586	.210
VAL SEX	7.489	1	7.489	1.586	.210
EXPLAINED	24.894	3	8.298	1.757	.158
RESIDUAL	746.176	158	4.723		
TOTAL	771.069	161	4.789		

163 CASES
1 MISSING (.6 PCT)

ABILTY
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	4.503	2	2.251	.320	.727
VAL	4.126	1	4.126	.586	.445
SEX	.302	1	.302	.043	.836
2-WAY INTERACTION	.598	1	.598	.085	.771
VAL SEX	.598	1	.598	.085	.771
EXPLAINED	5.100	3	1.700	.241	.867
RESIDUAL	1113.259	158	7.046		
TOTAL	1118.360	161	6.946		

163 CASES
1 MISSING (.6 PCT)

ENERGY
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	2.231	2	1.116	.084	.919
VAL	1.989	1	1.989	.150	.699
SEX	.287	1	.287	.022	.883
2-WAY INTERACTION	.545	1	.545	.041	.840
VAL SEX	.545	1	.545	.041	.840
EXPLAINED	2.776	3	.925	.070	.976
RESIDUAL	2093.792	158	13.252		
TOTAL	2096.568	161	13.022		

163 CASES
1 MISSING (.6 PCT)

GROW
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	6.750	2	3.375	.669	.514
VAL	2.692	1	2.692	.534	.466
SEX	4.262	1	4.262	.845	.359
2-WAY INTERACTION	.001	1	.001	.000	.987
VAL SEX	.001	1	.001	.000	.987
EXPLAINED	6.752	3	2.251	.446	.720
RESIDUAL	796.748	158	5.043		
TOTAL	803.500	161	4.991		

163 CASES
1 MISSING (.6 PCT)

CONSUM
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	27.780	2	13.890	1.766	.174
VAL	21.892	1	21.892	2.783	.097
SEX	6.608	1	6.608	.840	.361
2-WAY INTERACTION	10.821	1	10.821	1.376	.243
VAL SEX	10.821	1	10.821	1.376	.243
EXPLAINED	38.601	3	12.867	1.636	.183
RESIDUAL	1242.800	158	7.866		
TOTAL	1281.401	161	7.959		

163 CASES
1 MISSING (.6 PCT)

CONSERV
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	1.423	2	.712	.146	.864
VAL	1.333	1	1.333	.273	.602
SEX	.070	1	.070	.014	.905
2-WAY INTERACTION	7.438	1	7.438	1.524	.219
VAL SEX	7.438	1	7.438	1.524	.219
EXPLAINED	8.861	3	2.954	.605	.613
RESIDUAL	771.091	158	4.880		
TOTAL	779.952	161	4.844		

163 CASES
1 MISSING (.6 PCT)

BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	46.460	2	23.230	1.080	.342
VAL	.078	1	.078	.004	.952
SEX	46.450	1	46.450	2.159	.144
2-WAY INTERACTION	14.674	1	14.674	.682	.410
VAL SEX	14.674	1	14.674	.682	.410
EXPLAINED	61.134	3	20.378	.947	.419
RESIDUAL	3377.810	157	21.515		
TOTAL	3438.944	160	21.493		

162 CASES
1 MISSING (.6 PCT)

PERSOL
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	6.336	2	3.178	.158	.854
VAL	5.830	1	5.830	.290	.591
SEX	.422	1	.422	.021	.885
2-WAY INTERACTION	9.507	1	9.507	.473	.492
VAL SEX	9.507	1	9.507	.473	.492
EXPLAINED	15.864	3	5.288	.263	.852
RESIDUAL	3173.136	158	20.083		
TOTAL	3189.000	161	19.807		

163 CASES
1 MISSING (.6 PCT)

EDSOL
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	4.290	2	2.145	.756	.471
VAL	3.520	1	3.520	1.241	.267
SEX	.875	1	.875	.309	.579
2-WAY INTERACTION	15.018	1	15.018	5.296	.023
VAL SEX	15.018	1	15.018	5.296	.023
EXPLAINED	19.308	3	6.436	2.270	.083
RESIDUAL	448.038	158	2.836		
TOTAL	467.346	161	2.903		

163 CASES
1 MISSING (.6 PCT)

LIFSOL
BY VAL
SEX

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	17.593	2	8.796	3.266	.041
VAL	14.305	1	14.305	5.312	.022
SEX	3.724	1	3.724	1.383	.241
2-WAY INTERACTION	.002	1	.002	.001	.977
VAL SEX	.002	1	.002	.001	.977
EXPLAINED	17.595	3	5.865	2.178	.093
RESIDUAL	425.530	158	2.693		
TOTAL	443.125	161	2.752		

163 CASES
1 MISSING (.6 PCT)

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BLF EGY
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	25.782	4	6.425	.958	.431
VAL	6.768	1	6.768	.957	.330
GAD	18.558	3	6.186	.874	.456
2-WAY INTERACTION	20.561	3	6.854	.959	.409
VAL GAD	20.561	3	6.854	.959	.409
EXPLAINED	46.264	7	6.609	.934	.482
RESIDUAL	1068.227	151	7.074		
TOTAL	1114.491	158	7.054		

162 CASES
3 MISSING (1.9 PCT)

BLF ENV
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	85.258	4	21.314	1.404	.235
VAL	65.988	1	65.988	4.345	.039
GAD	13.039	3	4.446	.293	.830
2-WAY INTERACTION	78.576	3	26.192	1.726	.164
VAL GAD	78.576	3	26.192	1.726	.164
EXPLAINED	163.834	7	23.405	1.542	.157
RESIDUAL	2291.675	151	15.177		
TOTAL	2455.509	158	15.541		

162 CASES
3 MISSING (1.9 PCT)

VALUE
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	37.141	4	9.285	2.035	.092
VAL	8.766	1	8.766	1.922	.168
GAD	25.418	3	8.473	1.857	.139
2-WAY INTERACTION	17.026	3	5.675	1.244	.296
VAL GAD	17.026	3	5.675	1.244	.296
EXPLAINED	54.167	7	7.738	1.696	.114
RESIDUAL	693.419	152	4.562		
TOTAL	747.586	159	4.702		

163 CASES
3 MISSING (1.8 PCT)

ABILTY
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	10.326	4	2.582	.356	.840
VAL	4.574	1	4.574	.630	.428
GAD	6.315	3	2.105	.290	.833
2-WAY INTERACTION	4.269	3	1.423	.196	.899
VAL GAD	4.269	3	1.423	.196	.899
EXPLAINED	14.595	7	2.085	.287	.958
RESIDUAL	1102.953	152	7.256		
TOTAL	1117.548	159	7.029		

163 CASES
3 MISSING (1.8 PCT)

ENERGY
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	7.019	4	1.755	.132	.970
VAL	.433	1	.433	.033	.857
GAD	6.279	3	2.093	.158	.924
2-WAY INTERACTION	26.370	3	8.790	.663	.576
VAL GAD	26.370	3	8.790	.663	.576
EXPLAINED	33.389	7	4.770	.360	.924
RESIDUAL	2015.586	152	13.260		
TOTAL	2048.975	159	12.887		

163 CASES
3 MISSING (1.8 PCT)

GROW
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	36.761	4	9.190	1.856	.121
VAL	2.728	1	2.728	.551	.459
GAD	32.950	3	10.983	2.219	.088
2-WAY INTERACTION	9.077	3	3.026	.611	.609
VAL GAD	9.077	3	3.026	.611	.609
EXPLAINED	45.838	7	6.548	1.323	.243
RESIDUAL	752.506	152	4.951		
TOTAL	798.344	159	5.021		

163 CASES
3 MISSING (1.8 PCT)

CONSUM
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	62.078	4	15.519	1.948	.105
VAL	17.562	1	17.562	2.205	.140
GAD	42.049	3	14.016	1.759	.157
2-WAY INTERACTION	4.297	3	1.432	.180	.910
VAL GAD	4.297	3	1.432	.180	.910
EXPLAINED	66.375	7	9.482	1.190	.312
RESIDUAL	1210.900	152	7.966		
TOTAL	1277.275	159	8.033		

163 CASES
3 MISSING (1.8 PCT)

CONSERV
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	20.320	4	5.080	1.020	.399
VAL	2.267	1	2.267	.455	.501
GAD	18.622	3	6.207	1.247	.295
2-WAY INTERACTION	1.153	3	.384	.077	.972
VAL GAD	1.153	3	.384	.077	.972
EXPLAINED	21.474	7	3.068	.616	.742
RESIDUAL	756.800	152	4.979		
TOTAL	778.273	159	4.895		

163 CASES
3 MISSING (1.8 PCT)

POLSOL
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	19.923	4	4.981	.224	.925
VAL	.241	1	.241	.011	.917
GAD	17.948	3	6.016	.298	.827
2-WAY INTERACTION	48.601	3	16.200	.729	.536
VAL GAD	48.601	3	16.200	.729	.536
EXPLAINED	68.524	7	9.789	.440	.875
RESIDUAL	3357.074	151	22.232		
TOTAL	3425.597	158	21.681		

162 CASES
3 MISSING (1.9 PCT)

PERSOL
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	83.918	4	20.980	1.045	.386
VAL	3.539	1	3.539	.176	.675
GAD	76.621	3	25.540	1.272	.286
2-WAY INTERACTION	46.786	3	15.595	.777	.509
VAL GAD	46.786	3	15.595	.777	.509
EXPLAINED	130.705	7	18.672	.930	.485
RESIDUAL	3051.789	152	20.078		
TOTAL	3182.494	159	20.016		

163 CASES
3 MISSING (1.8 PCT)

EDSOL
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	8.034	4	2.008	.669	.614
VAL	2.914	1	2.914	.971	.326
GAD	5.367	3	1.789	.596	.619
2-WAY INTERACTION	1.821	3	.607	.202	.895
VAL GAD	1.821	3	.607	.202	.895
EXPLAINED	9.855	7	1.408	.469	.856
RESIDUAL	456.245	152	3.002		
TOTAL	466.100	159	2.931		

163 CASES
3 MISSING (1.8 PCT)

LIFSOL
BY VAL
GAD

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	11.586	4	2.896	1.164	.329
VAL	10.531	1	10.531	4.231	.041
GAD	1.798	3	.599	.241	.868
2-WAY INTERACTION	21.034	3	7.011	2.817	.041
VAL GAD	21.034	3	7.011	2.817	.041
EXPLAINED	32.620	7	4.660	1.872	.078
RESIDUAL	378.379	152	2.489		
TOTAL	410.993	159	2.585		

163 CASES
3 MISSING (1.8 PCT)

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BLF EGY
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	18.726	3	6.242	.884	.451
VAL	4.832	1	4.832	.685	.409
A12	12.570	2	6.285	.890	.413
2-WAY INTERACTION	1.134	2	.567	.080	.923
VAL A12	1.134	2	.567	.080	.923
EXPLAINED	19.860	5	3.972	.563	.728
RESIDUAL	1087.084	154	7.059		
TOTAL	1106.944	159	6.962		

162 CASES
2 MISSING (1.2 PCT)

BLF ENV
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	118.960	3	39.653	2.648	.051
VAL	63.033	1	63.033	4.209	.042
A12	46.480	2	23.240	1.552	.215
2-WAY INTERACTION	16.483	2	8.241	.550	.578
VAL A12	16.483	2	8.241	.550	.578
EXPLAINED	135.442	5	27.088	1.809	.114
RESIDUAL	2306.333	154	14.976		
TOTAL	2441.775	159	15.357		

162 CASES
2 MISSING (1.2 PCT)

VALUE
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	47.013	3	15.671	3.382	.020
VAL	10.620	1	10.620	2.292	.132
A12	33.227	2	16.614	3.585	.030
2-WAY INTERACTION	.135	2	.067	.015	.986
VAL A12	.135	2	.067	.015	.986
EXPLAINED	47.148	5	9.430	2.035	.077
RESIDUAL	727.503	157	4.634		
TOTAL	774.650	162	4.782		

163 CASES
0 MISSING (0 PCT)

ABILTY
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	17.219	3	5.740	.839	.474
VAL	5.021	1	5.021	.734	.393
A12	13.072	2	6.536	.955	.387
2-WAY INTERACTION	27.153	2	13.576	1.985	.141
VAL A12	27.153	2	13.576	1.985	.141
EXPLAINED	44.372	5	8.874	1.297	.268
RESIDUAL	1073.999	157	6.841		
TOTAL	1118.371	162	6.904		

163 CASES
0 MISSING (0 PCT)

ENERGY
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	30.464	3	10.155	.785	.504
VAL	1.901	1	1.901	.147	.702
A12	28.390	2	14.195	1.098	.336
2-WAY INTERACTION	36.035	2	18.017	1.393	.251
VAL A12	36.035	2	18.017	1.393	.251
EXPLAINED	66.499	5	13.300	1.028	.403
RESIDUAL	2030.544	157	12.933		
TOTAL	2097.043	162	12.945		

163 CASES
0 MISSING (0 PCT)

GROW
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	18.421	3	6.140	1.243	.296
VAL	2.140	1	2.140	.433	.511
A12	15.717	2	7.858	1.591	.207
2-WAY INTERACTION	10.444	2	5.222	1.057	.350
VAL A12	10.444	2	5.222	1.057	.350
EXPLAINED	28.865	5	5.773	1.169	.327
RESIDUAL	775.628	157	4.940		
TOTAL	804.494	162	4.966		

163 CASES
0 MISSING (0 PCT)

CONSUM
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	24.287	3	8.096	1.017	.387
VAL	19.002	1	19.002	2.387	.124
A12	3.859	2	1.929	.242	.785
2-WAY INTERACTION	8.189	2	4.094	.514	.599
VAL A12	8.189	2	4.094	.514	.599
EXPLAINED	32.476	5	6.495	.816	.540
RESIDUAL	1249.871	157	7.961		
TOTAL	1282.347	162	7.916		

163 CASES
0 MISSING (0 PCT)

CONSERV
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	29.161	3	9.720	2.070	.106
VAL	1.626	1	1.626	.346	.557
A12	27.799	2	13.900	2.960	.055
2-WAY INTERACTION	13.545	2	6.772	1.442	.240
VAL A12	13.545	2	6.772	1.442	.240
EXPLAINED	42.705	5	8.541	1.819	.112
RESIDUAL	737.255	157	4.696		
TOTAL	779.960	162	4.815		

163 CASES
0 MISSING (0 PCT)

PQL SOL
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	29.659	3	9.953	.459	.711
VAL	.317	1	.317	.015	.904
A12	29.777	2	14.888	.687	.505
2-WAY INTERACTION	32.434	2	16.217	.749	.475
VAL A12	32.434	2	16.217	.749	.475
EXPLAINED	62.293	5	12.459	.575	.719
RESIDUAL	3336.401	154	21.665		
TOTAL	3398.694	159	21.375		

162 CASES
2 MISSING (1.2 PCT)

PERSOL
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	38.550	3	12.850	.645	.587
VAL	5.974	1	5.974	.300	.585
A12	32.373	2	16.187	.813	.445
2-WAY INTERACTION	24.790	2	12.395	.622	.538
VAL A12	24.790	2	12.395	.622	.538
EXPLAINED	63.339	5	12.668	.636	.672
RESIDUAL	3126.262	157	19.912		
TOTAL	3189.601	162	19.689		

163 CASES
0 MISSING (0 PCT)

EDSOL
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	4.340	3	1.447	.500	.683
VAL	3.195	1	3.195	1.105	.295
A12	1.193	2	.596	.206	.814
2-WAY INTERACTION	9.986	2	4.993	1.727	.181
VAL A12	9.986	2	4.993	1.727	.181
EXPLAINED	14.326	5	2.865	.991	.425
RESIDUAL	453.953	157	2.891		
TOTAL	468.279	162	2.891		

163 CASES
0 MISSING (0 PCT)

LIFSOL
BY VAL
A12

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	15.753	3	5.251	1.959	.122
VAL	13.989	1	13.989	5.220	.024
A12	1.564	2	.792	.296	.745
2-WAY INTERACTION	7.112	2	3.556	1.327	.268
VAL A12	7.112	2	3.556	1.327	.268
EXPLAINED	22.864	5	4.573	1.706	.136
RESIDUAL	420.740	157	2.680		
TOTAL	443.604	162	2.738		

163 CASES
0 MISSING (0 PCT)

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BLF E&V
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	14.834	3	4.945	.719	.542
VAL	5.792	1	5.792	.842	.360
A13	10.095	2	5.047	.734	.482
2-WAY INTERACTION	6.031	2	3.015	.439	.646
VAL A13	6.031	2	3.015	.439	.646
EXPLAINED	20.865	5	4.173	.607	.695
RESIDUAL	1058.910	154	6.876		
TOTAL	1079.775	159	6.791		

162 CASES
2 MISSING (1.2 PCT)

BLF ENV
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	221.095	3	73.698	5.097	.002
VAL	64.803	1	64.803	4.481	.036
A13	152.943	2	76.472	5.289	.006
2-WAY INTERACTION	4.728	2	2.364	.163	.849
VAL A13	4.728	2	2.364	.163	.849
EXPLAINED	225.823	5	45.165	3.123	.010
RESIDUAL	2226.920	154	14.461		
TOTAL	2452.744	159	15.426		

162 CASES
2 MISSING (1.2 PCT)

VALUE
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	30.018	3	10.006	2.161	.095
VAL	14.699	1	14.699	3.175	.077
A13	16.232	2	8.116	1.753	.177
2-WAY INTERACTION	17.693	2	8.846	1.911	.151
VAL A13	17.693	2	8.846	1.911	.151
EXPLAINED	47.711	5	9.542	2.061	.073
RESIDUAL	726.940	157	4.630		
TOTAL	774.650	162	4.782		

163 CASES
0 MISSING (0 PCT)

ABILTY
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGN.F OF F
MAIN EFFECTS	6.138	3	2.046	.297	.828
VAL	3.904	1	3.904	.566	.453
A13	1.991	2	.996	.144	.866
2-WAY INTERACTION	29.304	2	14.652	2.124	.123
VAL A13	29.304	2	14.652	2.124	.123
EXPLAINED	35.442	5	7.088	1.028	.403
RESIDUAL	1082.929	157	6.898		
TOTAL	1118.371	162	6.904		

163 CASES
0 MISSING (0 PCT)

ENERGY
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	75.300	3	25.100	1.988	.118
VAL	3.196	1	3.196	.253	.616
A13	73.226	2	36.613	2.900	.058
2-WAY INTERACTION	39.890	2	19.945	1.580	.209
VAL A13	39.890	2	19.945	1.580	.209
EXPLAINED	115.190	5	23.038	1.825	.111
RESIDUAL	1981.853	157	12.623		
TOTAL	2097.043	162	12.945		

163 CASES
0 MISSING (0 PCT)

GROW
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	43.599	3	14.533	3.014	.032
VAL	1.893	1	1.893	.392	.532
A13	40.894	2	20.447	4.240	.016
2-WAY INTERACTION	3.806	2	1.903	.395	.675
VAL A13	3.806	2	1.903	.395	.675
EXPLAINED	47.405	5	9.481	1.966	.037
RESIDUAL	757.089	157	4.822		
TOTAL	804.494	162	4.966		

163 CASES
0 MISSING (0 PCT)

CONSUM
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	37.491	3	12.497	1.606	.190
VAL	19.869	1	19.869	2.553	.112
A13	17.062	2	8.531	1.096	.337
2-WAY INTERACTION	22.803	2	11.402	1.465	.234
VAL A13	22.803	2	11.402	1.465	.234
EXPLAINED	60.294	5	12.059	1.549	.178
RESIDUAL	1222.053	157	7.784		
TOTAL	1282.347	162	7.916		

163 CASES
0 MISSING (0 PCT)

CONSERV
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	12.272	3	4.091	.869	.459
VAL	1.156	1	1.156	.246	.621
A13	10.911	2	5.455	1.159	.317
2-WAY INTERACTION	28.509	2	14.254	3.028	.051
VAL A13	28.509	2	14.254	3.028	.051
EXPLAINED	40.781	5	8.156	1.732	.130
RESIDUAL	739.179	157	4.708		
TOTAL	779.960	162	4.815		

163 CASES
0 MISSING (0 PCT)

POLSOL
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	14.319	3	4.773	.226	.878
VAL	.739	1	.739	.035	.852
A13	13.580	2	6.790	.322	.733
2-WAY INTERACTION	55.393	2	27.697	1.314	.272
VAL A13	55.393	2	27.697	1.314	.272
EXPLAINED	69.713	5	13.943	.661	.653
RESIDUAL	3246.687	154	21.082		
TOTAL	3316.400	159	20.858		

162 CASES
2 MISSING (1.2 PCT)

PERSOL
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	33.882	3	11.294	.584	.627
VAL	5.757	1	5.757	.297	.586
A13	27.706	2	13.853	.716	.490
2-WAY INTERACTION	117.221	2	58.610	3.028	.051
VAL A13	117.221	2	58.610	3.028	.051
EXPLAINED	151.103	5	30.221	1.562	.174
RESIDUAL	3038.498	157	19.353		
TOTAL	3189.601	162	19.689		

163 CASES
0 MISSING (0 PCT)

EDSOL
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	4.959	3	1.653	.566	.638
VAL	3.144	1	3.144	1.076	.301
A13	1.812	2	.906	.310	.734
2-WAY INTERACTION	4.450	2	2.225	.761	.469
VAL A13	4.450	2	2.225	.761	.469
EXPLAINED	9.409	5	1.882	.644	.667
RESIDUAL	458.870	157	2.923		
TOTAL	468.279	162	2.891		

163 CASES
0 MISSING (0 PCT)

LIFSOL
BY VAL
A13

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	18.976	3	6.325	2.343	.075
VAL	14.621	1	14.621	5.415	.021
A13	4.808	2	2.404	.890	.413
2-WAY INTERACTION	.698	2	.349	.129	.879
VAL A13	.698	2	.349	.129	.879
EXPLAINED	19.674	5	3.935	1.457	.207
RESIDUAL	423.930	157	2.700		
TOTAL	443.604	162	2.738		

163 CASES
0 MISSING (0 PCT)

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BY VAL

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	18.653	2	9.327	1.338	.265
VAL	10.268	1	10.268	1.473	.227
	8.102	1	8.102	1.162	.283
2-WAY INTERACTION	9.613	1	9.613	1.379	.242
VAL	9.613	1	9.613	1.379	.242
EXPLAINED	28.267	3	9.422	1.351	.260
RESIDUAL	1094.727	157	6.973		
TOTAL	1122.994	160	7.019		

162 CASES
1 MISSING (.6 PCT)

BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	79.340	2	39.670	2.658	.073
VAL	74.831	1	74.831	5.013	.026
HP	3.965	1	3.965	.267	.606
2-WAY INTERACTION	33.377	1	33.377	2.245	.136
VAL HP	33.377	1	33.377	2.245	.136
EXPLAINED	112.717	3	37.572	2.527	.059
RESIDUAL	2334.488	157	14.869		
TOTAL	2447.205	160	15.295		

162 CASES
1 MISSING (.6 PCT)

VALUE
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	24.554	3	8.185	1.746	.160
VAL	11.977	1	11.977	2.555	.112
HP	10.769	2	5.384	1.149	.320
2-WAY INTERACTION	14.219	2	7.110	1.517	.223
VAL HP	14.219	2	7.110	1.517	.223
EXPLAINED	38.773	5	7.755	1.654	.149
RESIDUAL	735.877	157	4.687		
TOTAL	774.650	162	4.782		

163 CASES
0 MISSING (0 PCT)

ABILTY
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	59.099	3	19.700	2.939	.035
VAL	4.144	1	4.144	.618	.433
HP	54.952	2	27.476	4.099	.018
2-WAY INTERACTION	6.816	2	3.408	.508	.602
VAL HP	6.816	2	3.408	.508	.602
EXPLAINED	65.915	5	13.183	1.967	.087
RESIDUAL	1052.456	157	6.704		
TOTAL	1118.371	162	6.904		

163 CASES
0 MISSING (0 PCT)

ENERGY
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	12.246	3	4.082	.308	.820
VAL	2.496	1	2.496	.188	.665
HP	10.172	2	5.086	.384	.682
2-WAY INTERACTION	3.697	2	1.848	.139	.870
VAL HP	3.697	2	1.848	.139	.870
EXPLAINED	15.942	5	3.188	.241	.944
RESIDUAL	2081.101	157	13.255		
TOTAL	2097.043	162	12.945		

163 CASES
0 MISSING (0 PCT)

GROW
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	19.293	3	6.431	1.300	.276
VAL	1.713	1	1.713	.346	.557
HP	16.589	2	8.294	1.677	.190
2-WAY INTERACTION	8.485	2	4.242	.858	.426
VAL HP	8.485	2	4.242	.858	.426
EXPLAINED	27.778	5	5.556	1.123	.350
RESIDUAL	776.715	157	4.947		
TOTAL	804.494	162	4.966		

163 CASES
0 MISSING (0 PCT)

CONSUM
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	28.424	3	9.475	1.229	.301
VAL	22.386	1	22.386	2.905	.090
HP	7.995	2	3.998	.519	.596
2-WAY INTERACTION	43.990	2	21.995	2.854	.061
VAL HP	43.990	2	21.995	2.854	.061
EXPLAINED	72.413	5	14.483	1.879	.101
RESIDUAL	1209.933	157	7.707		
TOTAL	1282.347	162	7.916		

163 CASES
0 MISSING (0 PCT)

CONSERV
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	9.360	3	3.120	.651	.583
VAL	1.033	1	1.033	.216	.643
HP	7.999	2	3.999	.835	.436
2-WAY INTERACTION	18.480	2	9.240	1.929	.149
VAL HP	18.480	2	9.240	1.929	.149
EXPLAINED	27.840	5	5.568	1.162	.330
RESIDUAL	752.120	157	4.791		
TOTAL	779.960	162	4.815		

163 CASES
0 MISSING (0 PCT)

POLSOL
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	8.216	2	4.108	.190	.827
VAL	.016	1	.016	.001	.978
A15	8.187	1	8.187	.378	.540
2-WAY INTERACTION	36.166	1	36.166	1.670	.198
VAL A15	36.166	1	36.166	1.670	.198
EXPLAINED	44.382	3	14.794	.683	.564
RESIDUAL	3399.593	157	21.653		
TOTAL	3443.975	160	21.525		

163 CASES
1 MISSING (.6 PCT)

PERSOL
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	48.360	3	16.120	.840	.474
VAL	6.268	1	6.268	.327	.569
HP	42.183	2	21.092	1.099	.336
2-WAY INTERACTION	127.354	2	63.677	3.317	.039
VAL HP	127.354	2	63.677	3.317	.039
EXPLAINED	175.713	5	35.143	1.831	.110
RESIDUAL	3013.888	157	19.197		
TOTAL	3189.601	162	19.689		

163 CASES
0 MISSING (0 PCT)

EDSOL
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	3.749	3	1.250	.425	.736
VAL	3.322	1	3.322	1.128	.290
HP	.602	2	.301	.102	.903
2-WAY INTERACTION	2.347	2	1.173	.399	.672
VAL HP	2.347	2	1.173	.399	.672
EXPLAINED	6.096	5	1.219	.414	.838
RESIDUAL	462.183	157	2.944		
TOTAL	468.279	162	2.891		

163 CASES
0 MISSING (0 PCT)

LIFSOL
BY VAL
HP

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIGNIF OF F
MAIN EFFECTS	15.657	3	5.219	1.921	.128
VAL	13.710	1	13.710	5.047	.026
HP	1.489	2	.745	.274	.761
2-WAY INTERACTION	1.437	2	.719	.265	.768
VAL HP	1.437	2	.719	.265	.768
EXPLAINED	17.095	5	3.419	1.259	.285
RESIDUAL	426.510	157	2.717		
TOTAL	443.604	162	2.738		

163 CASES
0 MISSING (0 PCT)

CRITERION VARIABLE BLEEDGY
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.025	2.651	162	
VAL	1.	.193	2.586	88	
SEX	0	-1.000	.	1	
SEX	1.	.481	2.697	54	
SEX	2.	-.242	2.398	33	
VAL	2.	-.284	2.722	74	
SEX	1.	-.045	2.949	44	
SEX	2.	-.633	2.356	30	

TOTAL CASES = 162

CRITERION VARIABLE BLEEDIN
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.302	3.907	162	
VAL	1.	.909	3.847	88	
SEX	0	-5.000	.	1	
SEX	1.	.222	4.128	54	
SEX	2.	2.212	2.891	33	
VAL	2.	-.419	3.882	74	
SEX	1.	-.500	3.447	44	
SEX	2.	-.300	4.504	30	

TOTAL CASES = 162

CRITERION VARIABLE VALUE
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.113	2.187	163	
VAL	1.	.152	2.248	89	
SEX	0	-2.000	0	1	
SEX	1.	.118	2.483	55	
SEX	2.	.273	1.825	33	
VAL	2.	-.432	2.081	74	
SEX	1.	-.136	1.995	44	
SEX	2.	-.867	2.161	30	

TOTAL CASES = 163

CRITERION VARIABLE ABILTY
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.107	2.627	163	
VAL	1.	.253	2.649	89	
SEX	0	0	0	1	
SEX	1.	.245	2.745	55	
SEX	2.	.273	2.565	33	
VAL	2.	-.068	2.608	74	
SEX	1.	.023	2.937	44	
SEX	2.	-.200	2.074	30	

TOTAL CASES = 163

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.313	3.598	163	
VAL	1.	-.416	3.327	89	
SEX	0	-1.000	0	1	
SEX	1.	-.418	3.419	55	
SEX	2.	-.394	3.271	33	
VAL	2.	-.189	3.918	74	
SEX	1.	-.102	3.996	44	
SEX	2.	-.317	3.865	30	

TOTAL CASES = 163

CRITERION VARIABLE GROW
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.006	2.228	163	
VAL	1.	.124	2.182	89	
SEX	0	1.000	0	1	
SEX	1.	-.009	2.233	55	
SEX	2.	.318	2.143	33	
VAL	2.	-.135	2.289	74	
SEX	1.	-.273	2.346	44	
SEX	2.	.067	2.227	30	

TOTAL CASES = 163

CRITERION VARIABLE CONSUM
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.031	2.813	163	
VAL	1.	.292	2.688	89	
SEX	0	-1.000	0	1	
SEX	1.	.333	3.100	55	
SEX	2.	.258	1.896	33	
VAL	2.	-.419	2.928	74	
SEX	1.	-.818	3.357	44	
SEX	2.	.167	2.069	30	

TOTAL CASES = 163

CRITERION VARIABLE CONSERV
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.089	2.194	163	
VAL	1.	-.006	1.917	89	
SEX	0	0	0	1	
SEX	1.	.164	2.071	55	
SEX	2.	-.288	1.654	33	
VAL	2.	-.189	2.498	74	
SEX	1.	-.364	2.829	44	
SEX	2.	.067	1.929	30	

TOTAL CASES = 163

CRITERION VARIABLE POLSOL
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.000	4.628	162	
VAL	1.	1.023	4.526	88	
SEX	0	4.000	0	1	
SEX	1.	.352	5.014	54	
SEX	2.	2.030	3.459	33	
VAL	2.	.973	4.777	74	
SEX	1.	.795	4.638	44	
SEX	2.	1.233	5.042	30	

TOTAL CASES = 162

CRITERION VARIABLE PERSOL
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.227	4.437	163	
VAL	1.	.404	4.642	89	
SEX	0	1.000	0	1	
SEX	1.	.264	4.772	55	
SEX	2.	.621	4.554	33	
VAL	2.	.014	4.199	74	
SEX	1.	.273	4.167	44	
SEX	2.	-.367	4.287	30	

TOTAL CASES = 163

CRITERION VARIABLE EDSOL
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.037	1.700	163	
VAL	1.	-.090	1.738	89	
SEX	0	1.000	0	1	
SEX	1.	-.264	1.745	55	
SEX	2.	.167	1.735	33	
VAL	2.	.189	1.653	74	
SEX	1.	.523	1.607	44	
SEX	2.	-.300	1.622	30	

TOTAL CASES = 163

CRITERION VARIABLE LIFSOL
BROKEN DOWN BY VAL
BY SEX

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.310	1.655	163	
VAL	1.	.579	1.590	89	
SEX	0	1.000	0	1	
SEX	1.	.455	1.525	55	
SEX	2.	.773	1.719	33	
VAL	2.	-.014	1.684	74	
SEX	1.	-.136	1.912	44	
SEX	2.	.167	1.289	30	

TOTAL CASES = 163

CRITERION VARIABLE BLF EGY
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.025	2.651	162	
VAL	1.	.193	2.586	88	
GAD	0	1.667	2.082	3	
GAD	9.	-.625	2.615	8	
GAD	10.	.057	2.520	35	
GAD	11.	.323	2.638	31	
GAD	12.	.455	2.945	11	
VAL	2.	-.284	2.722	74	
GAD	9.	.667	1.528	3	
GAD	10.	-.688	3.146	32	
GAD	11.	.500	2.102	26	
GAD	12.	-1.077	2.691	13	

TOTAL CASES = 162

CRITERION VARIABLE SLF ENV
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.302	3.907	162	
VAL	1.	.909	3.847	88	
GAD	0	.333	1.155	3	
GAD	9.	1.375	2.774	8	
GAD	10.	.343	3.654	35	
GAD	11.	1.355	4.013	31	
GAD	12.	-.636	5.085	11	
VAL	2.	-.419	3.802	74	
GAD	9.	1.667	1.528	3	
GAD	10.	-.939	3.618	32	
GAD	11.	-.808	4.214	26	
GAD	12.	1.154	3.455	13	

TOTAL CASES = 162

CRITERION VARIABLE VALUE
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.113	2.187	163	
VAL	1.	.152	2.248	89	
GAD	0	1.333	3.215	3	
GAD	9.	.875	1.642	8	
GAD	10.	.657	2.155	35	
GAD	11.	-.359	1.859	32	
GAD	12.	-.818	3.227	11	
VAL	2.	-.432	2.081	74	
GAD	9.	.333	1.155	3	
GAD	10.	-.531	1.741	32	
GAD	11.	-.077	2.682	26	
GAD	12.	-1.077	1.553	13	

TOTAL CASES = 163

CRITERION VARIABLE ABILTY
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.107	2.627	163	
VAL	1.	.253	2.649	89	
GAD	0	.333	.577	3	
GAD	9.	-.125	.991	8	
GAD	10.	.471	3.270	35	
GAD	11.	.188	2.546	32	
GAD	12.	0	2.049	11	
VAL	2.	-.068	2.608	74	
GAD	9.	-1.333	2.082	3	
GAD	10.	-.094	2.878	32	
GAD	11.	.192	1.855	26	
GAD	12.	-.231	3.395	13	

TOTAL CASES = 163

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.313	3.598	163	
VAL	1.	-.416	3.327	89	
GAD	0	-3.000	3.606	3	
GAD	9.	-.750	2.915	8	
GAD	10.	-.086	3.375	35	
GAD	11.	-.094	3.020	32	
GAD	12.	-1.455	4.228	11	
VAL	2.	-.189	3.918	74	
GAD	9.	-1.333	1.528	3	
GAD	10.	-.125	4.396	32	
GAD	11.	-.500	3.432	26	
GAD	12.	.538	4.176	13	

TOTAL CASES = 163

CRITERION VARIABLE GROW
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.006	2.228	163	
VAL	1.	.124	2.182	89	
GAD	0	-1.333	.577	3	
GAD	9.	1.688	1.945	8	
GAD	10.	.114	2.166	35	
GAD	11.	-.281	2.129	32	
GAD	12.	.591	2.417	11	
VAL	2.	-.135	2.289	74	
GAD	9.	.667	.577	3	
GAD	10.	-.594	2.046	32	
GAD	11.	0	2.698	26	
GAD	12.	.538	2.145	13	

TOTAL CASES = 163

CRITERION VARIABLE CONSUM
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.031	2.813	163	
VAL	1.	.292	2.668	89	
GAD	0	.333	1.528	3	
GAD	9.	1.188	2.235	8	
GAD	10.	-.057	3.334	35	
GAD	11.	.219	2.181	32	
GAD	12.	.955	2.350	11	
VAL	2.	-.419	2.928	74	
GAD	9.	1.333	1.155	3	
GAD	10.	-1.063	3.037	32	
GAD	11.	-.192	2.593	26	
GAD	12.	.308	3.401	13	

TOTAL CASES = 163

CRITERION VARIABLE CONSERV
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.089	2.194	163	
VAL	1.	-.006	1.917	89	
GAD	0	-.667	.577	3	
GAD	9.	-.938	1.266	8	
GAD	10.	-.057	2.057	35	
GAD	11.	.313	1.908	32	
GAD	12.	.091	2.071	11	
VAL	2.	-.189	2.498	74	
GAD	9.	-1.000	1.000	3	
GAD	10.	-.406	3.120	32	
GAD	11.	.269	2.146	26	
GAD	12.	-.385	1.502	13	

TOTAL CASES = 163

CRITERION VARIABLE POLSOL
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.000	4.628	162	
VAL	1.	1.023	4.524	88	
GAD	0	3.667	.577	3	
GAD	9.	1.875	2.031	8	
GAD	10.	1.000	4.765	35	
GAD	11.	.935	4.328	31	
GAD	12.	0	6.181	11	
VAL	2.	.973	4.777	74	
GAD	9.	1.667	3.055	3	
GAD	10.	.219	5.326	32	
GAD	11.	1.038	4.591	26	
GAD	12.	2.538	3.973	13	

TOTAL CASES = 162

CRITERION VARIABLE PERSOL
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.227	4.437	163	
VAL	1.	.404	4.642	89	
GAD	0	-.667	1.528	3	
GAD	9.	1.000	2.449	8	
GAD	10.	-.300	5.030	35	
GAD	11.	1.031	4.626	32	
GAD	12.	.682	5.377	11	
VAL	2.	.014	4.199	74	
GAD	9.	5.000	1.000	3	
GAD	10.	-.531	3.389	32	
GAD	11.	.346	5.184	26	
GAD	12.	-.462	3.733	13	

TOTAL CASES = 163

CRITERION VARIABLE EDSOL
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.037	1.700	163	
VAL	1.	-.090	1.738	89	
GAD	0	-.667	.577	3	
GAD	9.	.250	1.282	8	
GAD	10.	-.186	1.724	35	
GAD	11.	-.016	1.928	32	
GAD	12.	-.091	1.868	11	
VAL	2.	.189	1.653	74	
GAD	9.	.333	2.517	3	
GAD	10.	-.125	1.289	32	
GAD	11.	.385	1.920	26	
GAD	12.	.538	1.761	13	

TOTAL CASES = 163

CRITERION VARIABLE LIFSOL
BROKEN DOWN BY VAL
BY GAD

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.310	1.655	163	
VAL	1.	.579	1.590	89	
GAD	0	3.333	1.528	3	
GAD	9.	.063	1.016	8	
GAD	10.	.857	1.517	35	
GAD	11.	.281	1.420	32	
GAD	12.	.182	1.940	11	
VAL	2.	-.014	1.684	74	
GAD	9.	0	0	3	
GAD	10.	-.500	2.200	32	
GAD	11.	.308	1.050	26	
GAD	12.	.538	1.127	13	

TOTAL CASES = 163

CRITERION VARIABLE RLSEGY
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.025	2.651	162	
VAL	1.	.193	2.586	88	
A12	1.	.226	2.404	31	
A12	2.	.485	2.600	33	
A12	3.	-.391	2.808	23	
A12	15.	3.000	0	1	
VAL	2.	-.284	2.722	74	
A12	0	-4.000	0	1	
A12	1.	-.250	2.577	28	
A12	2.	.045	2.214	22	
A12	3.	-.478	3.315	23	

TOTAL CASES = 162

CRITERION VARIABLE SELF ENV
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.302	3.907	162	
VAL	1.	.909	3.847	88	
A12	1.	1.290	4.035	31	
A12	2.	1.273	3.403	33	
A12	3.	.043	4.194	23	
A12	15.	-3.000	0	1	
VAL	2.	-.419	3.882	74	
A12	0	-2.000	0	1	
A12	1.	-.786	3.947	28	
A12	2.	.682	3.183	22	
A12	3.	-.957	4.405	23	

TOTAL CASES = 162

CRITERION VARIABLE VALUE
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.113	2.187	163	
VAL	1.	.152	2.248	89	
A12	1.	.136	2.081	33	
A12	2.	.621	1.988	33	
A12	3.	-.900	2.716	23	
VAL	2.	-.432	2.081	74	
A12	1.	-.310	2.222	29	
A12	2.	.091	1.571	22	
A12	3.	-1.087	2.234	23	

TOTAL CASES = 163

CRITERION VARIABLE ABILTY
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.107	2.627	163	
VAL	1.	.253	2.649	89	
A12	1.	-.379	2.631	33	
A12	2.	.242	2.610	33	
A12	3.	1.174	2.570	23	
VAL	2.	-.068	2.608	74	
A12	1.	.276	1.980	29	
A12	2.	-.500	2.521	22	
A12	3.	-.087	3.343	23	

TOTAL CASES = 163

2 of 1

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.313	3.598	163	
VAL	1.	-.416	3.327	89	
A12	1.	-.318	2.730	33	
A12	2.	-.152	3.212	33	
A12	3.	-.935	4.246	23	
VAL	2.	-.189	3.918	74	
A12	1.	.428	3.702	29	
A12	2.	-1.227	3.804	22	
A12	3.	-.478	4.144	23	

TOTAL CASES = 163

CRITERION VARIABLE GROW
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.006	2.218	163	
VAL	1.	.124	2.102	89	
A12	1.	.591	1.934	33	
A12	2.	.273	2.198	33	
A12	3.	-.761	2.325	23	
VAL	2.	-.135	2.289	74	
A12	1.	-.103	2.110	29	
A12	2.	-.091	1.900	22	
A12	3.	-.217	2.876	23	

TOTAL CASES = 163

CRITERION VARIABLE CONSUM
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.031	2.813	163	
VAL	1.	.292	2.688	89	
A12	1.	.288	2.643	33	
A12	2.	.667	2.618	33	
A12	3.	-.239	2.875	23	
VAL	2.	-.419	2.928	74	
A12	1.	-.345	2.857	29	
A12	2.	-.591	2.840	22	
A12	3.	-.348	3.214	23	

TOTAL CASES = 163

2.12

CRITERION VARIABLE CONSERV
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.089	2.194	163	
VAL	1.	-.006	1.917	89	
A12	1.	.424	1.921	33	
A12	2.	0	1.969	33	
A12	3.	-.630	1.733	23	
VAL	2.	-.189	2.498	74	
A12	1.	.448	2.181	29	
A12	2.	-1.000	2.489	22	
A12	3.	-.217	2.907	23	

TOTAL CASES = 163

CRITERION VARIABLE POLSOL
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.776	2.923	163	
VAL	1.	.868	2.798	89	
A12	1.	1.000	2.598	33	
A12	2.	1.030	2.675	33	
A12	3.	.522	3.301	23	
VAL	2.	.642	3.081	74	
A12	1.	.569	3.489	29	
A12	2.	.818	3.049	22	
A12	3.	.565	2.660	23	

TOTAL CASES = 163

CRITERION VARIABLE PERSOL
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.227	4.437	163	
VAL	1.	.404	4.642	89	
A12	1.	1.303	4.442	33	
A12	2.	-.182	4.859	33	
A12	3.	-.043	4.507	23	
VAL	2.	.014	4.199	74	
A12	1.	.138	3.989	29	
A12	2.	.500	4.009	22	
A12	3.	-.609	4.717	23	

TOTAL CASES = 163

CRITERION VARIABLE EOSOL
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.037	1.700	163	
VAL	1.	-.090	1.738	89	
A12	1.	.227	1.941	33	
A12	2.	-.379	1.305	33	
A12	3.	-.130	1.961	23	
VAL	2.	.159	1.653	74	
A12	1.	.034	1.349	29	
A12	2.	.591	1.817	22	
A12	3.	0	1.834	23	

TOTAL CASES = 163

CRITERION VARIABLE LIFSOL
BROKEN DOWN BY VAL
BY A12

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.310	1.655	163	
VAL	1.	.579	1.590	89	
A12	1.	.485	1.372	33	
A12	2.	.818	1.357	33	
A12	3.	.370	2.133	23	
VAL	2.	-.014	1.684	74	
A12	1.	-.172	2.001	29	
A12	2.	-.227	1.232	22	
A12	3.	.391	1.616	23	

TOTAL CASES = 163

CRITERION VARIABLE RLFEGY
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.025	2.651	162	
VAL	1.	.193	2.586	88	
A13	1.	-.286	2.327	21	
A13	2.	.175	2.448	40	
A13	3.	.593	2.978	27	
VAL	2.	-.284	2.722	74	
A13	0	-5.000	1.414	2	
A13	1.	.077	1.706	13	
A13	2.	-.500	2.590	32	
A13	3.	.148	3.060	27	

TOTAL CASES = 162

CRITERION VARIABLE [illegible]
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N VALUE LABEL
FOR ENTIRE POPULATION		.302	3.907	162
VAL	1.	.909	3.647	88
A13	1.	2.048	4.421	21
A13	2.	.025	3.370	40
A13	3.	1.333	3.873	27
VAL	2.	-.419	3.882	74
A1	0	-1.000	1.414	2
A13	1.	1.231	2.455	13
A13	2.	-1.656	4.591	32
A13	3.	.259	3.265	27

TOTAL CASES = 162

CRITERION VARIABLE VALUE
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N VALUE LABEL
FOR ENTIRE POPULATION		-.113	2.187	163
VAL	1.	.152	2.248	89
A13	1.	.256	2.544	39
A13	2.	-.833	1.560	21
A13	3.	.724	2.068	29
VAL	2.	-.432	2.081	74
A13	1.	-.700	2.103	30
A13	2.	-.235	1.821	17
A13	3.	-.259	2.246	27

TOTAL CASES = 163

CRITERION VARIABLE ABILTY
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N VALUE LABEL
FOR ENTIRE POPULATION		.107	2.627	163
VAL	1.	.253	2.649	89
A13	1.	.744	3.193	39
A13	2.	-.214	2.041	21
A13	3.	-.069	2.154	29
VAL	2.	-.068	2.608	74
A13	1.	-.500	2.047	30
A13	2.	.647	3.517	17
A13	3.	-.037	2.504	27

TOTAL CASES = 163

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.313	3.598	163	
VAL	1.	-.416	3.327	89	
A13	1.	.526	3.175	39	
A13	2.	-.500	3.612	21	
A13	3.	-1.621	3.008	29	
VAL	2.	-.189	3.918	74	
A13	1.	-.317	3.793	30	
A13	2.	1.029	4.645	17	
A13	3.	-.815	3.520	27	

TOTAL CASES = 163

CRITERION VARIABLE GROW
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.006	2.228	163	
VAL	1.	.124	2.182	89	
A13	1.	.654	2.453	39	
A13	2.	.143	1.905	21	
A13	3.	-.603	1.810	29	
VAL	2.	-.135	2.289	74	
A13	1.	.133	2.501	30	
A13	2.	.412	1.661	17	
A13	3.	-.778	2.309	27	

TOTAL CASES = 163

CRITERION VARIABLE CONSUM
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.031	2.813	163	
VAL	1.	.292	2.688	89	
A13	1.	.551	2.707	39	
A13	2.	.571	2.993	21	
A13	3.	-.259	2.430	29	
VAL	2.	-.419	2.928	74	
A13	1.	-1.033	2.723	30	
A13	2.	.529	2.695	17	
A13	3.	-.333	3.211	27	

TOTAL CASES = 163

CRITERION VARIABLE CONSERV
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.089	2.194	163	
VAL	1.	-.006	1.917	89	
A13	1.	-.077	1.911	39	
A13	2.	-.143	1.852	21	
A13	3.	.190	2.020	29	
VAL	2.	-.189	2.498	74	
A13	1.	-.067	2.067	30	
A13	2.	.882	2.288	17	
A13	3.	-1.000	2.842	27	

TOTAL CASES = 163

CRITERION VARIABLE POLSOL
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.000	4.628	162	
VAL	1.	1.023	4.526	88	
A13	1.	1.143	6.901	21	
A13	2.	.225	3.577	40	
A13	3.	2.111	3.238	27	
VAL	2.	.973	4.777	74	
A13	0	-7.000	1.414	2	
A13	1.	.769	4.024	13	
A13	2.	1.625	5.917	32	
A13	3.	.889	3.055	27	

TOTAL CASES = 162

CRITERION VARIABLE PERSOL
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.227	4.437	163	
VAL	1.	.404	4.642	89	
A13	1.	.846	4.728	39	
A13	2.	-.214	5.776	21	
A13	3.	.259	3.602	29	
VAL	2.	.014	4.199	74	
A13	1.	-.867	4.674	30	
A13	2.	2.412	3.726	17	
A13	3.	-.519	3.412	27	

TOTAL CASES = 163

CRITERION VARIABLE EDSOL
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.037	1.700	163	
VAL	1.	-.090	1.708	89	
A13	1.	-.231	1.884	39	
A13	2.	-.071	1.886	21	
A13	3.	.086	1.440	29	
VAL	2.	.189	1.653	74	
A13	1.	.200	1.584	30	
A13	2.	.588	1.770	17	
A13	3.	-.074	1.662	27	

TOTAL CASES = 163

CRITERION VARIABLE LIFSOL
BROKEN DOWN BY VAL
BY A13

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.310	1.655	163	
VAL	1.	.579	1.590	89	
A13	1.	.539	1.553	39	
A13	2.	.429	1.720	21	
A13	3.	.741	1.585	29	
VAL	2.	-.014	1.684	74	
A13	1.	0	1.983	30	
A13	2.	-.412	1.228	17	
A13	3.	.222	1.577	27	

TOTAL CASES = 163

CRITERION VARIABLE BLF EGY
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.025	2.651	162	
VAL	1.	.193	2.586	88	
HP	0	-3.000	0	1	
HP	1.	.227	2.534	75	
HP	2.	.250	2.958	12	
VAL	2.	-.284	2.722	74	
HP	1.	-.079	2.732	63	
HP	2.	-1.455	2.464	11	

TOTAL CASES = 162

CRITERION VARIABLE BLFENV
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.302	3.907	162	
VAL	1.	.909	3.847	88	
HP	0	-3.000	0	1	
HP	1.	1.187	3.540	75	
HP	2.	-.500	5.351	12	
VAL	2.	-.419	3.882	74	
HP	1.	-.556	4.035	63	
HP	2.	.364	2.873	11	

TOTAL CASES = 162

CRITERION VARIABLE VALUE
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.113	2.187	163	
VAL	1.	.152	2.248	89	
HP	1.	.800	2.273	35	
HP	2.	-.290	1.948	31	
HP	3.	-.239	2.440	23	
VAL	2.	-.432	2.061	74	
HP	1.	-.542	2.322	24	
HP	2.	-.308	2.131	26	
HP	3.	-.458	1.841	24	

TOTAL CASES = 163

CRITERION VARIABLE ABILTY
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.107	2.627	163	
VAL	1.	.253	2.649	89	
HP	1.	.871	3.042	35	
HP	2.	-.645	2.153	31	
HP	3.	.522	2.372	23	
VAL	2.	-.068	2.608	74	
HP	1.	0	2.064	24	
HP	2.	-.731	2.601	26	
HP	3.	.583	3.006	24	

TOTAL CASES = 163

CRITERION VARIABLE ENERGY
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.313	3.598	163	
VAL	1.	-.416	3.327	89	
HP	1.	-.157	2.925	35	
HP	2.	-.855	3.397	31	
HP	3.	-.217	3.861	23	
VAL	2.	-.189	3.918	74	
HP	1.	.167	4.999	24	
HP	2.	-.308	4.222	26	
HP	3.	-.417	2.041	24	

TOTAL CASES = 163

CRITERION VARIABLE GROW
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.006	2.228	163	
VAL	1.	.124	2.182	89	
HP	1.	.643	2.221	35	
HP	2.	-.016	2.185	31	
HP	3.	-.478	2.020	23	
VAL	2.	-.135	2.289	74	
HP	1.	-.167	2.599	24	
HP	2.	.231	2.643	26	
HP	3.	-.500	1.414	24	

TOTAL CASES = 163

CRITERION VARIABLE CONSUM
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.031	2.813	163	
VAL	1.	.292	2.688	89	
HP	1.	.386	3.025	35	
HP	2.	-.242	1.875	31	
HP	3.	.870	3.035	23	
VAL	2.	-.419	2.928	74	
HP	1.	-1.250	2.524	24	
HP	2.	.423	3.164	26	
HP	3.	-.500	2.904	24	

TOTAL CASES = 163

CRITERION VARIABLE CONSERV
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		-.089	2.194	163	
VAL	1.	-.006	1.917	89	
HP	1.	.300	2.066	35	
HP	2.	.065	1.769	31	
HP	3.	-.565	1.830	23	
VAL	2.	-.189	2.498	74	
HP	1.	.042	2.010	24	
HP	2.	-.808	3.124	26	
HP	3.	.250	2.111	24	

TOTAL CASES = 163

CRITERION VARIABLE POLSOL
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		1.000	4.628	162	
VAL	1.	1.023	4.526	88	
HP	0	3.000	.	1	
HP	1.	1.267	4.244	75	
HP	2.	-.667	6.080	12	
VAL	2.	.973	4.777	74	
HP	1.	.857	5.048	63	
HP	2.	1.636	2.838	11	

TOTAL CASES = 162

CRITERION VARIABLE PERSOL
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.227	4.43	163	
VAL	1.	.404	4.642	89	
HP	1.	1.700	4.359	35	
HP	2.	-.984	4.118	31	
HP	3.	.304	5.321	23	
VAL	2.	.014	4.199	74	
HP	1.	-1.083	5.081	24	
HP	2.	.154	3.885	26	
HP	3.	.958	3.394	24	

TOTAL CASES = 163

CRITERION VARIABLE EDSOL
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.037	1.700	163	
VAL	1.	-.090	1.738	89	
HP	1.	-.071	1.956	35	
HP	2.	.081	1.550	31	
HP	3.	-.348	1.068	23	
VAL	2.	.189	1.653	74	
HP	1.	.250	1.962	24	
HP	2.	.077	1.671	26	
HP	3.	.250	1.327	24	

TOTAL CASES = 163

CRITERION VARIABLE LIFSOL
BROKEN DOWN BY VAL
BY HP

VARIABLE	CODE	MEAN	STD. DEV.	N	VALUE LABEL
FOR ENTIRE POPULATION		.310	1.655	163	
VAL	1.	.579	1.590	89	
HP	1.	.671	1.519	35	
HP	2.	.613	1.476	31	
HP	3.	.391	1.877	23	
VAL	2.	-.014	1.684	74	
HP	1.	-.167	2.120	24	
HP	2.	.192	1.600	26	
HP	3.	-.083	1.283	24	

TOTAL CASES = 163

APPENDIX C-4

CLASSROOM LEVEL DATA: KNOWLEDGE, ATTITUDES, AND REACTIONS

Key: VALUES (SPACE) = Values Clarification or Spaceship Earth treatment teacher
INQUIRY (EEC) = Social Science Inquiry of Environmental Crisis/Energy Crisis treatment teacher
SUB = Suburban
RUR = Rural
SCI = Science teacher
SS = Social studies teacher
C = Control class
E = Experimental class
N = Number of students

Note: Scores on knowledge and attitudes are mean change scores.

Teacher	N		KNOWLEDGE TESTS General		Energy		Land Use		Total	
	C	E	C	E	C	E	C	E	C	E
A VALUES (SPACE) SUB SCI 1	6	11	1.00	1.82	.17	2.46	0.00	.46	1.17	4.73
B VALUES (SPACE) SUB SCI 2	15	11	.27	.18	1.67	.55	1.80	.82	3.73	1.55
C VALUES (SPACE) SUB SS 1	13	12	.69	.92	1.08	2.17	.69	1.42	2.46	4.50
D VALUES (SPACE) SUB SS 2	10	10	-.50	.90	.50	.60	-1.70	.80	-1.70	2.30
E VALUES (SPACE) RUR SCI 1	9	8	.56	2.75	.33	.88	.44	-.25	1.33	3.38
F VALUES (SPACE) RUR SCI 2	6	10	-.67	-.50	-.33	2.30	-.67	1.10	-1.67	2.90
G VALUES (SPACE) RUR SS 1	13	13	.39	-.08	.62	-.92	.15	1.54	1.15	.54
H VALUES (SPACE) RUR SS 2	11	12	.09	1.25	-.09	1.83	2.00	1.33	2.00	4.42
I INQUIRY (EEC) SUB SCI 1	10	15	-.70	.20	-.60	2.07	0.00	1.13	-1.30	3.40
J INQUIRY (EEC) SUB SCI 2	4	9	.25	1.56	-.75	.11	.75	-.78	.25	.89
K INQUIRY (EEC) SUB SS 1	9	10	1.22	.10	-1.00	1.40	.33	.90	.56	2.40
L INQUIRY (EEC) SUB SS 2	13	12	-.31	.50	-.15	.75	.62	1.92	.15	3.17
M INQUIRY (EEC) RUR SCI 1	11	12	-.18	.42	-.18	1.50	-1.55	.08	-1.91	2.00
N INQUIRY (EEC) RUR SCI 2	9	5	-.11	.60	.78	1.40	-.22	2.60	.44	4.60
O INQUIRY (EEC) RUR SS 1	8	13	.88	1.77	.88	1.54	1.00	2.00	2.75	5.23
P INQUIRY (EED) RUR SS 2	5	9	.40	1.22	.20	-.22	1.20	1.89	1.80	2.89
TOTAL	152	172								

Teacher	N		ATTITUDE SCALES Env Prob		Energy Prob		Val Env		Ability	
	C	E	C	E	C	E	C	E	C	E
A VALUES (SPACE) SUB SCI 1	7	10	.86	2.10	.43	-.80	-1.00	-.50	1.57	0.00
B VALUES (SPACE) SUB SCI 2	11	13	-3.64	-.46	-1.46	-.23	1.46	-1.19	.59	.69
C VALUES (SPACE) SUB SS 1	10	13	-1.60	.39	-.10	2.08	-1.00	.54	-.30	-.77
D VALUES (SPACE) SUB SS 2	13	12	.46	.46	-1.15	.73	-.46	.25	-1.23	.33
E VALUES (SPACE) RUR SCI 1	8	8	2.00	3.88	-1.13	.13	-.25	1.00	2.50	.38
F VALUES (SPACE) RUR SCI 2	7	9	-.43	-.33	-.43	0.00	0.00	.39	-1.57	-.72
G VALUES (SPACE) RUR SS 1	9	12	-1.00	2.25	-1.89	.17	.67	.54	.61	.58
H VALUES (SPACE) RUR SS 2	13	12	-.08	0.00	-.69	-.83	-1.15	.50	-1.00	1.33
I INQUIRY (EEC) SUB SCI 1	7	11	.71	.18	-2.00	1.09	0.00	1.00	-.73	1.00
J INQUIRY (EEC) SUB SCI 2	4	7	3.00	1.00	-1.50	-.57	-.75	1.43	-1.50	.14
K INQUIRY (EEC) SUB SS 1	10	7	1.10	-1.43	-.70	.43	-.60	-.14	-.70	.14
L INQUIRY (EEC) SUB SS 2	11	12	-2.82	2.08	-.91	-.25	-2.09	-.58	-.64	.17
M INQUIRY (EEC) RUR SCI 1	12	13	1.08	-1.69	.25	-.69	.17	-.69	-.92	-.69
N INQUIRY (EEC) RUR SCI 2	10	6	-1.50	1.83	-.70	-1.83	-1.50	0.00	-.80	1.67
O INQUIRY (EEC) RUR SS 1	10	11	.80	-2.45	-2.40	-.36	-.55	-.73	-1.25	-.36
P INQUIRY (EEC) RUR SS 2	8	7	-.88	-2.43	-.75	-.71	-1.50	-1.29	-.05	-2.43
TOTAL	150	163								

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ATTITUDE SCALES (continued)

Teacher	Tradeoffs								Solutions							
	Energy		Growth		Consumption		Conservation		Pol/Leg		Personal		Education		Life Style	
	C	E	C	E	C	E	C	E	C	E	C	E	C	E	C	E
A	1.29	-.30	0.00	-.10	2.14	1.10	0.00	-1.10	.71	-.40	-.86	-.85	.57	.15	0.00	.60
B	.82	-.73	.91	-.85	1.18	.23	-.36	.54	-.36	-.15	-1.09	-.69	0.00	-1.00	-.27	.31
C	.80	-1.27	-.70	-.15	-.90	.08	.50	-.92	1.10	-.54	1.60	-.15	.70	-.23	-.50	.54
D	.23	-1.04	-1.31	-.92	.92	-.25	-1.39	-.17	.23	.64	-1.35	-.17	-.46	-.58	.08	1.08
E	2.31	.25	-.13	.50	.50	.75	1.13	.38	1.38	4.00	-1.38	.75	-.63	.88	.86	1.60
F	.64	-.39	.07	1.39	-.14	1.39	.86	.17	1.00	1.44	-1.14	1.72	-.43	.83	1.00	-.28
G	1.11	1.29	-.39	.96	.22	-.04	-.78	.50	-1.33	1.50	-2.00	4.04	-.67	.67	-.44	.67
H	-.19	-.79	-.46	.67	-2.15	-.33	-1.00	.58	-1.31	2.75	-.08	-1.04	-.69	-.75	-.62	.67
I	-.86	-.09	.29	.55	.29	0.00	.29	.55	-.29	.73	.86	.36	.29	.36	-.57	-.18
J	-.75	.43	0.00	1.57	.50	.43	-.50	.29	1.75	1.29	1.00	1.00	1.75	.57	.50	.71
K	-.30	1.71	.30	1.00	.10	-.29	-.90	-.14	.10	.14	.20	3.29	-1.00	.86	-.60	-1.00
L	.55	.29	-.32	-1.08	-.73	-.83	.32	-.67	-.64	4.25	-.59	1.67	0.00	1.00	.59	.33
M	-1.54	-.77	-.08	-.62	.25	-.23	-.58	.08	.58	.62	-1.92	-.23	-.71	.23	.33	.31
N	-.30	-.50	.40	-.50	.40	-.33	-.80	.17	.70	1.50	.80	-.50	.10	-.67	-.10	-.50
O	.05	-.14	-.45	-1.00	.50	-.91	.80	-1.27	3.00	-1.91	.30	-2.09	.65	-.27	.55	-.36
P	.13	-2.43	.25	.14	-.75	-1.00	-.63	-.14	1.88	1.00	.38	-3.43	-.50	-1.14	-.63	.29

STUDENT REACTIONS

Teacher	#1 Interesting	#2 Learn	#3 Particip.	#4 Not Difficult	#5 Recommend	Total Average	N
A VALUES (SPACE) SUB SCI 1	3.18	3.14	2.68	3.27	3.45	3.14	22
B VALUES (SPACE) SUB SCI 2	1.71	2.62	2.62	2.95	1.43	2.27	21
C VALUES (SPACE) SUB SS 1	2.48	3.23	2.94	3.10	3.00	2.95	31
D VALUES (SPACE) SUB SS 2	2.48	2.84	2.48	3.24	2.52	2.71	25
E VALUES (SPACE) RUR SCI 1	2.88	3.47	2.94	2.88	3.35	3.10	17
F VALUES (SPACE) RUR SCI 2	2.82	3.23	2.55	3.32	3.27	3.04	22
G VALUES (SPACE) RUR SS 1	3.11	3.74	2.89	3.19	3.33	3.25	27
H VALUES (SPACE) RUR SS 2	2.31	2.69	2.66	2.94	2.88	2.70	32
I INQUIRY (EEC) SUB SCI 1	2.68	3.07	1.72	2.68	2.90	2.61	28
J INQUIRY (EEC) SUB SCI 2	2.94	3.24	2.60	2.76	2.94	2.90	17
K INQUIRY (EEC) SUB SS 1	1.88	3.06	1.47	2.69	2.75	2.37	16
L INQUIRY (EEC) SUB SS 2	2.85	3.40	2.00	3.15	3.15	2.91	20
M INQUIRY (EEC) RUR SCI 1	2.57	3.33	2.50	2.97	2.60	2.79	30
N INQUIRY (EEC) RUR SCI 2	2.91	3.36	1.91	3.55	2.91	2.93	11
O INQUIRY (EEC) RUR SS 1	2.38	3.00	2.06	2.94	2.75	2.63	16
P INQUIRY (EEC) RUR SS 2	2.20	3.20	2.00	2.35	2.70	2.49	20

Student Reaction Scale

4	3	2	1	0
Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

Scores in matrix are classroom means for the experimental groups.

APPENDIX C-5

OVERVIEW OF THE KNOWLEDGE AND ATTITUDE INSTRUMENTS AND RESULTS

Scale	Survey Form	Possible Range of Scores	Pretest Mean and Standard Deviation Entire Population	
Cognitive:	#5 Items		Mean	Sx
General Knowledge	1-13, 61-64	0.00 - 17.00	10.72	2.88
Energy Knowledge	14-32	0.00 - 19.00	11.32	3.75
Land Use Knowledge	33-60	0.00 - 28.00	16.25	4.16
Total Knowledge	1-64	0.00 - 64.00	38.30	9.36
Affective:	#7 Items	Range of Scores		
Seriousness of Environmental Problem	1, 4-7, 11, 15-18	10.00 - 40.00	19.20	4.18
Seriousness of Energy Problem	2-3, 8-10, 19-20	7.00 - 28.00	17.12	2.63
Valuing Environment	21-25	4.00 - 20.00	17.32	2.24
Ability to Help	26-31	6.00 - 24.00	18.17	2.71
Energy Tradeoff	32-34, 44-47, 57	8.00 - 32.00	23.10	3.81
Growth Tradeoff	35-38, 48, 49, 58	7.00 - 28.00	15.30	2.53
Consumption Tradeoff	39-42, 50-52	7.00 - 28.00	20.19	3.32
Conservation Tradeoff	43, 53-56	5.00 - 20.00	15.97	2.23
Political/Legal Solutions	59-65, 72-77	13.00 - 52.00	27.65	4.67
Personal Solutions	78-88	11.00 - 44.00	32.21	5.39
Education Solutions	66-68	3.00 - 12.00	9.72	1.68
Life Style Solutions	69-71	3.00 - 12.00	8.71	1.63
Locus of Control	101-110	10.00 - 40.00		4.24
Faith in Human Nature	111-115	5.00 - 20.00		1.74

SCALE	MEAN CHANGE SCORES CONT.	EXP.	Exp'tal Only SPACE	EEC	MEANING OF HIGH MEAN OR POSITIVE MEAN CHANGE
Cognitive:					
General Knowledge	.20	.85	.91	.80	Know a lot or learned some
Energy Knowledge	.19	1.15	1.23	1.07	Know a lot or learned some
Land Use Knowledge	.30	1.06	.90	1.22	Know a lot or learned some
Total Knowledge	.70	3.06	3.04	3.08	Know a lot or learned some
Affective:					
Seriousness of Environmental Problem	-.26	.34	1.03	-.36	Believing in the seriousness and importance of environmental problems
Seriousness of Energy Problem	-.95	-.10	.15	-.36	Believing in the seriousness and importance of energy problems
Valuing Environment	-.48	-.08	.19	-.34	Appreciating the natural environment
Ability to Help	-.63	.09	.23	-.04	I feel I can do something to help the environment
Energy Tradeoff	.15	-.28	-.37	-.18	Protecting the environment is more important
Growth Tradeoff	-.10	.10	.19	.01	Protecting the environment is more important
Consumption Tradeoff	.15	-.02	.37	-.39	Protecting the environment is more important
Conservation Tradeoff	-.19	-.07	.01	-.14	Conserve resources rather than use them now
Political/Legal Solutions	.44	1.10	1.25	.95	Political/legal solutions needed and desired
Personal Solutions	-.33	.23	.45	.01	I would promote doing things to help protect the environment
Education Solutions	-.06	.06	0.00	.12	Education is a useful and needed way to help solve energy and environmental problems
Life Style Solutions	.01	.26	.57	-.05	If people change their life styles that would help solve environmental problems

APPENDIX C-6

TEACHER CURRICULUM EVALUATION FORM

RESULTS

Title of the book DECIDING HOW TO LIVE ON SPACESHIP EARTH

Author(s) Allen, Fett, Ulrich, Woolard

Teacher's name Responses of eight teachers who used this book.

School and district

Grade level of students that text was used with 9-12

Sections of the text actually taught Varied from the required sections to entire bk.

Ave. score		4 Strongly Agree	3 Agree	2 Uncertain	1 Disagree	0 Strongly Disagree	No. of responses
3.25	1. The readings are clearly written and appropriate for this grade level.	3	4	1	0	0	=8
3.44	2. The questions and activities stimulated student thinking and learning.	4	5	0	0	0	=9*
2.56	3. The major concepts are well developed.	2	4	0	3	0	=9*
2.75	4. Ample teaching suggestions are provided either in the student text or teaching guide.	2	4	0	2	0	=8
1.88	5. Sufficient guidelines or procedures to evaluate student progress are included.	0	2	3	3	0	=8
3.33	6. The text stimulated and/or maintained the interest of my students in environmental issues.	3	6	0	0	0	=9
3.00	7. This text helped my students learn important environmental concepts.	1	6	1	0	0	=8

8. What did you especially like about this text?
(over)

9. What did you especially dislike about this text?
(over)

10. What recommendations for revision or suggestions would you make for teachers using this text?
(over)

*One teacher put two responses on some of the items.

8. What did you especially like about this text?
   The case study approach=2
   Presented environmental problems as complex issues=2
   Open-ended question approach=2
   Its readability=1
   High interest=1
   Challenging=1
   Inquiry approach=1
   Adaptability of the text=1
   The Epilogue=1
   A clear set-up for role playing exercises=1
   Real issues=1
   Forces the students to examine their own values and take a stand=1

9. What did you especially dislike about this text?
   Lack of background information=3
   Nothing=2
   Some materials are environmentally biased=2
   Needed more detail=1
   Repetitious=1
   Doesn't really show the danger of environmental destruction=1
   Too open-ended=1

10. What recommendations for revisions or suggestions would you make for teachers using this text?
   Supplemental text for science classes; presents real situations for concepts and facts taught in science classes.=2
   Supplemental materials with factual data needed=2
   Thoroughly review any portion used; plan,extensively, student involvement=1
   Spend an entire nine weeks on it=1
   Works very well for small group discussion mode=1
   The cases are too similar=1
   Utilize the daily newspaper=1
   Lacks world view=1
   Utilize a greater variety of approaches and techniques than suggested=1

APPENDIX C-7

TEACHER CURRICULUM EVALUATION FORM

RESULTS

Title of the book THE ENERGY CRISIS/THE ENVIRONMENTAL CRISIS

Author(s) Bugbey and Tyler/ Myers and Knisley

Teacher's name Responses of eight teachers who used this book.

School and district

Grade level of students that text was used with 9-12

Sections of the text actually taught Sections required by SSEC plus teacher selections

Ave. score		4 Strongly Agree	3 Agree	2 Uncertain	1 Disagree	0 Strongly Disagree	No. of responses
3.10	1. The readings are clearly written and appropriate for this grade level.	3	6	0	1	0	=10*
3.10	2. The questions and activities stimulated student thinking and learning.	3	6	0	1	0	=10*
2.50	3. The major concepts are well developed.	1	4	4	1	0	=10*
2.00	4. Ample teaching suggestions are provided either in the student text or teaching guide.	0	5	0	5	0	=10*
0.90	5. Sufficient guidelines or procedures to evaluate student progress are included.	0	0	2	7	1	=10*
3.00	6. The text stimulated and/or maintained the interest of my students in environmental issues.	0	10	0	0	0	=10*
2.73	7. This text helped my students learn important environmental concepts.	2	7	0	1	1	=11*

8. What did you especially like about this text?
(over)

9. What did you especially dislike about this text?
(over)

10. What recommendations for revision or suggestions would you make for teachers using this text?
(over)

*Two teachers placed two responses on all items and one other teacher did so on item #7. They did so to indicate a difference between the two books Environmental Crisis and Energy Crisis.

8. What did you especially like about this text?

Good length readings for students=3
Good activities at the end of chapters=3
Good questions at the end of readings=2
Presented a variety of viewpoints=2
Covered major environmental problems/solutions well=1
Good organization=1
The articles were very interesting=1

9. What did you especially dislike about this text?

Nothing=2
Needed more science orientation=1
Some aspects dated=1
Lacked depth=1
Needed more statictical data=1
Vocabulary and reading level are inconsistent=1
It didn't provide enough of the important type of information necessary for arriving at an intelligent decision on the topic=1
Overall organization was awkward=1
Needed more student involvement through lab assignments=1

10. What recommendations for revision or suggestions would you make for teachers using this text?

Provide a teachers guide=3
Teacher should be familiar with the problems and be able to discuss them with the students=1
Find updated materials to complement the book=1
Create vocabulary lists=1
The books are a good supplement=1
Needs more information and meaningful activities in order to serve as basic text=1
Use reading skills approaches=1
Put all articles of one category in the same section of the book=1
A field trip guide should be provided=1
Teach in the fall or late spring so field trips may be included=1
Have an introduction section and a solution section with the varied viewpoints from all of the articles expressed=1

APPENDIX C-8

TEACHER RESPONSE TO MATERIALS PREFERENCE FORM

(Frequency numbers appear in parentheses before the title)

Environmental/Energy Crisis

1. From the materials supplied to you for the Environmental Education Project, identify and rank the two best articles. Briefly describe what conditions, materials, etc. made them so good.

A. (2) "When Did the Environment Become a Problem?"
--good introduction to problem
--had historical information

(2) "The Energy Crisis: Who Stole What?"
--dealt with fears and misconceptions; explained petroleum reserves, national energy policy

(2) "What Are Some Alternative Sources of Energy?"
--got students involved in field trips, alternative sources, posters to involve other students in school

(1) "The Crisis" p. 13
--provided concise statement of the issue which is so often overlooked

(1) "Trouble in Silver Bay"
--problems that may face many communities in this area

(1) "Mining" pp. 35-40
--concepts and vocabulary paralled my course. Promoted good discussion

(1) "The Plight of Aramco"
--policy decisions cannot be facilely made

(1) "Urbanization"
--students very concerned over the various problems created in the suburbs and cities

B. (1) "U.S. Policy: Rx for Disaster"
--insight into complexities of energy problems related to government policies

(1) "The Shortage Is a Myth"
--kids identified with problems well

(1) "When Did the Environment Become a Problem?"
--concepts and vocabulary paralled my course. Promoted good discussion

(1) "Don't Do Anything"
--got students involved in field trips, alternative sources, posters to involve other students in school

(1) "Ecological Imbalance"
--two classic examples of poorly applied technology; Nile Dam and DDT

B. Environmental/Energy Crisis continued

(1) "The Need for Eco-Variety"
--opened class to a philosophical discussion

(1) "What Are Some Alternative Sources of Energy?"
--constructed an analysis of solutions

(1) "Introduction" Energy Crisis
--laid a good foundation

(1) "Fog"
--should have been mandatory reading

(1) "The Energy Crisis: Who Stole What?"
--awakened many students to the crisis

2. From the same materials identify the one article that you wouldn't use again. Why?

(1) "Trouble in Silver Bay"
--not enough time to utilize all the materials in book. This article one of less significant ones

(1) "Land Purchase"
--some of the solutions not possible without change in social and political structure

(1) "Ecological Imbalance"
--students didn't think this should be used in field geology

(1) "What Are Some Alternative Sources of Energy?"
--does not rate relative values of alternatives

(1) "Solve the Energy Crisis Now!"
--could deal with national energy policy - doesn't - just a bunch of words - great topic blown

(1) "Urbanization"
--I have better materials; more meat needed

(1) "Confessions of a Polluter"
--Arthur Godfrey is outdated. I had to explain too much peripheral information

(1) "A Matter of Choice"
--provided the least amount of information and developed the least interest in the students

(1) "The Shortage Is a Myth"
--historical perspective is polemical rather than objective

(1) --all articles held student interest

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Deciding How To Live On Spaceship Earth

1. From the materials supplied to you for the Environmental Education Project, identify and rank the two best articles. Briefly describe what conditions, materials, etc. made them so good.

A. (3) "Coastal Zoning: A Role-Playing Case"
--involved numbers of students in controversial, thought-provoking, complex, problem
--each student related to booming Front Range condition
--good class debates and preparation for the debate. Enough information presented to represent various sides

(1) "No More Lizards"
--visual aids helped; short enough for all students to react within same time period

(1) "Our Future Together as Humans"
--super summarizing activity, made kids think about now and future

(1) "The Energy Crisis: Power for the People" with Epilogue
--strong student identification and timely and important locally. Role playing and adaptability for small group discussion very good

(1) "Turn on the Gas"
--pertinent to Colorado. Sparked excellent debate

(1) "Encounters with Choice"
--good introduction to problems - used this to divide class into groups

B. (2) "Energy and Its Use"
--new vocabulary; easily adapted to small group work. Each group able to identify problems and respond
--pertinent and current; a good summary article on Energy unit; student could always contribute no matter what viewpoint

(1) "The Energy Crisis: Power for the People"
--the personal preference indicators brought out some selfish desires. Also, the amount of non-renewable resources seemed to impress the students

(1) "People Pollution"
--Colorado faces problem of special interest groups

(1) "Design for Urban Living, Introduction"
--gave kids an idea of how complex our problems are

(1) "Man and 'His' Land"
--strong student identification; timely and important locally. Role playing and adaptability for small group discussion very good

B. Deciding How to Live on Spaceship Earth continued

(1) "Our Future Together As Humans"
--challenging finish - students responded well to problems

(1) "Paper Power"
--with little reading it introduced the conflicts of progress, pollution, cost, etc. Good class discussion

2. From the same materials identify the one article that you wouldn't use again. Why?

(3) "Barefoot in the Sand"
--probably because of the remoteness of the situation and open-ended approach to the problems involved
--had to relate to sea environment
--needed more research and facts.

(1) "Power Use and Power Payment"
--long; needed much explanation and research; repetitious questions

(1) "Noise: The Unseen Pollution"
--would probably use in a different sequence than I did

(1) "Deciding: A Role-Playing Case"
--similar to previous article; students felt the point of view was obvious and needed no debate; situation beyond student control, outcome decided by power structure

(1) "Politics and Prairie Dogs"
--needed more research and facts

(1) "People Pollution"
"High Price of Shopping"
"Bring 'Em Back Alive"
--too far off from our class topic

(1) --none

APPENDIX C-9

RESPONSE TABULATIONS FOR THE "STUDENT CURRICULUM EVALUATION FORM"

Included below are the most often listed student responses for questions six, seven, and eight for EEC and Spaceship Earth. The frequency appears beside each statement. Responses with a frequency of one have been omitted for lack of space. Also, some statements have been combined for these compilations, i.e., "objective" is tabulated with "considers both sides."

#6 (EEC) "What did you like most about this environmental education book?"

Informative = 29
Makes you realize the problems = 22
Interesting = 20
Factual = 19
Considers both sides = 19
Cartoons = 11
Illustrations = 11
Short readings = 11
Variety of articles; viewpoints = 10
Easy reading = 9
In-depth coverage = 7
Left blank = 5
Makes you think about the problems = 5
Everything = 4
Contemporary, real issues = 4

#7 (EEC) "What did you dislike most about this environmental education book?"

No dislikes = 35
Boring = 15
Couldn't understand very well = 13
Repetitious = 11
Left blank = 10
Some bias = 8
The questions = 7
Lacked organization = 5
Sometimes too drawn out = 4
Needed more facts = 3
Hard to read = 3
Some parts didn't say anything = 2
Skipped around too much = 2
Reading it = 2
The pre and post test = 2

#8 (EEC) "What suggestions would you make to teachers and students using this book?"

Read with comprehension = 29
None = 23
More discussions = 23
Left blank = 12
Get additional information and materials = 8
Don't assign too much = 7
Go more slowly = 6
Do more activities = 5
Do questions at the end of chapters = 4
Have guest speakers and field trips = 3
Compare with the local environment = 3
Be interested in the course before selecting it = 3
Only read the related parts = 2
Teachers should make up questions; don't use books' questions = 2
Book is good = 2
Read it alone = 2
Explain the contents better to us = 2
Get involved = 2

(158 students returned evaluation forms for the EEC books.)

#6 (SPACE) "What did you like most about this environmental education book?"

Presented contemporary, real problems = 42
The discussions = 31
The opportunity to decide on environmental problems = 26
Easy to read and understand = 27
Made you think = 23
Informative = 14
Considered both sides = 9
Good cases = 9
Good illustrations = 9
The problem-solving approach = 8
Small group work = 8
Put you into the situation instead of trying to explain it = 6
Interesting = 6
The questions = 4
The first situation = 4
Nothing = 4
Role playing = 3
Got to use your own ideas = 3
The activities = 3
I had a better understanding = 2
Few right or wrong answers = 2
Fun to listen = 2
Enjoyable situations = 2
You could get involved = 2
The short stories = 2
The conflicting situations = 2
Factual = 2
Problems not found in everyday life = 2
The trials = 2

#7 (SPACE) "What did you dislike most about this environmental education book?"

Nothing = 35
Sometimes one-sided = 35
Need more information = 21
Sometimes boring = 17
Sometimes repetitious = 14
Some cases hard to understand = 12
Left blank = 9
Some questions ambiguous = 6
The title = 4
Writing out answers to the questions = 4
Too lengthy = 4
The reading = 3
The participation sections = 3
It wasn't reality = 3
Too easy = 3
Some parts untrue = 2
Sometimes had to pick from one alternative or another when none seemed right = 2
Sometimes hard to solve problems = 2
Some group work = 2
No captions for pictures = 2
The whole thing = 2
There wasn't enough time to study the entire book = 2

#8 (SPACE) "What suggestions would you make to teachers and students using this book?"

Nothing = 32
More discussion = 28
Left blank = 20
Get involved = 10
Read thoroughly = 10
Get more data, research = 9
Get involved in activities = 8
Be open-minded = 7
Listen and try to understand = 6
Don't use it = 6
Read and participate = 5
Use the community as a resource = 5
Argue both sides = 4
Don't use every day = 4
More involvement in role playing assignments = 3
Go through it = 3
Use only as a supplement = 3
Don't think of these situations as games = 2
More field trips and variety of activities = 2
Go slow = 2
Understand that you have to take care of the environment = 2
Don't do most of the activities = 2
Students learn as much as possible = 2
Use a harder, more educated book = 2
Have more challenging assignments = 2
Let the class discussions determine the decisions = 2
Skip around in the book = 2
Have some fun things to do to make the book more fun = 2

(197 students returned evaluation forms for Spaceship Earth.)